EP-2806-SA3
SCSI to SATA II
RAID Subsystem

User Manual

Revision 1.1

Preface

About this manual

This manual provides information regarding the quick installation and hardware features of the **EP-2806-SA3 RAID subsystem**. This document also describes how to use the storage management software. Information contained in the manual has been reviewed for accuracy, but not for product warranty because of the various environment/OS/settings. Information and specifications will be changed without further notice.

This manual uses section numbering for every topic being discussed for easy and convenient way of finding information in accordance with the user's needs. The following icons are being used for some details and information to be considered in going through with this manual:

NOTES:
These are notes that contain useful information and tips that the user must give attention to in going through with the subsystem operation.

IMPORTANT!
These are the important information that the user must remember.

WARNING!
These are the warnings that the user must follow to avoid unnecessary errors and bodily injury during hardware and software operation of the subsystem.

CAUTION:
These are the cautions that user must be aware of to prevent damage to the equipment and its components.

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Changes

The material in this document is for information only and is subject to change without notice.

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Before You Begin

Before going through with this manual, you should read and focus on the following safety guidelines. Notes about the subsystem's controller configuration and the product packaging and delivery are also included.

Safety Guidelines

To provide reasonable protection against any harm on the part of the user and to obtain maximum performance, user is advised to be aware of the following safety guidelines particularly in handling hardware components:

Upon receiving of the product:

❖ Place the product in its proper location.
❖ To avoid unnecessary dropping out, make sure that somebody is around for immediate assistance.
❖ It should be handled with care to avoid dropping that may cause damage to the product. Always use the correct lifting procedures.

Upon installing of the product:

❖ Ambient temperature is very important for the installation site. It must not exceed 30°C. Due to seasonal climate changes; regulate the installation site temperature making it not to exceed the allowed ambient temperature.
❖ Before plugging-in any power cords, cables and connectors, make sure that the power switches are turned off. Disconnect first any power connection if the power supply module is being removed from the enclosure.
❖ Outlets must be accessible to the equipment.
❖ All external connections should be made using shielded cables and as much as possible should not be performed by bare hand. Using anti-static hand gloves is recommended.
❖ In installing each component, secure all the mounting screws and locks. Make sure that all screws are fully tightened. Follow correctly all the listed procedures in this manual for reliable performance.

Controller Configuration

This RAID subsystem supports single controller configuration.

Packaging, Shipment and Delivery

❖ Before removing the subsystem from the shipping carton, you should visually inspect the physical condition of the shipping carton.
❖ Unpack and verify that the contents of the shipping carton are complete and in good condition.
❖ Exterior damage to the shipping carton may indicate that the contents of the carton are damaged.
❖ If any damage is found, do not remove the components; contact the dealer where you purchased the subsystem for further instructions.

Unpacking the Subsystem

The package contains the following items:
- RAID subsystem unit
- Two power cords
- One external serial cable
- One external UPS cable
- One RJ-45 Ethernet cable
- Two external SCSI cables
- Two Active Terminators
- Installation Reference Guide
- Spare screws, etc.

If any of these items are missing or damaged, please contact your dealer or sales representative for assistance.

Chapter 1   Product Introduction

The EP-2806-SA3 RAID Subsystem

Features:

- Intel 80331 64 bit I/O processor
- Supports RAID levels 0, 1, 0+1, 3, 5, 6, 30, 50, NRAID and JBOD
- Dual SCSI Ultra320 host channels support clustering technology
- Instant availability and background initialization
- Supports hot spare and automatic hot rebuild
- Local audible event notification alarm
- Real time drive activity and status indicators
- Java based browser type GUI management utility
- Supports password protection and UPS connection
- Built-in Ethernet port interface for remote event notification
- Transparent data protection for all popular operating systems
- Supports multiple array enclosures per host connection

1.1   Identifying Parts of the EP-2806-SA3

The illustrations below identify the various parts of the subsystem. Each part will be discussed in details in the following sections of this manual.

1.1.1   Front View

The front section consists of the Drive Carriers and the Smart LCD Panel.

1.1.2   Rear View

The rear view consists of two Power Supply / Fan Modules and the Controller.
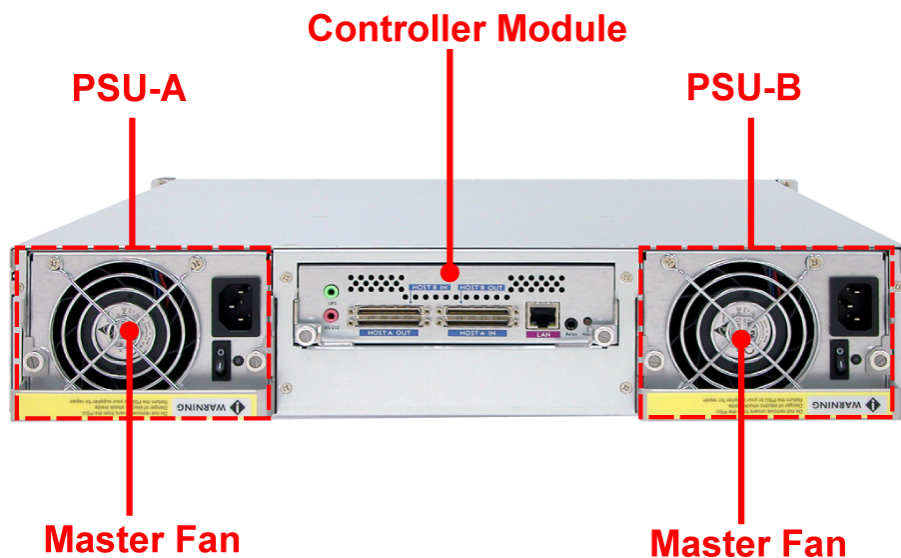
1.2 Enclosure Chassis

The EP-2806-SA3 is a redundant system with hot swappable disks and power supplies / cooling fans. The chassis assembly contains 8 drive bays at the front. These drive carriers are arranged in 2 rows of 4 drives. Each drive carrier is lockable and has a lock indicator.

At the rear, the chassis assembly contains two power supply / fan modules and one controller module. The power supply and cooling system is contained in one module for efficient cooling.

NOTE: The modules of the enclosure are interchangeable with other Epica products.

1.3   Technical Specifications

RAID Controller	U320 SCSI-to-SATA II
Host Bus Interface	Ultra 320 SCSI
Drive Bus Interface	SATA II
Data Transfer Rate	Up to 320MB/Sec
Cache Memory	256MB ~ 2GB ECC DDR SDRAM
RAID Processor	Intel 80331 64 bit RISC
Remote Management	R-Link Port
Monitor Port	RS232

1.3.1   RAID Features

RAID Level	0, 1, 0+1, 3, 5, 6, 30, 50, Linear and JBOD
RAID Roaming	Yes
Host Independent	Yes
Continuous Rebuild	Yes
Online Consistency Check	Yes
Failed Drive Auto Rebuild	Yes
Password Protection	Yes
Bad Block Auto-remapping	Yes
Hard Contact Relay Connection	Yes
SMTP Manager and SNMP Agent	Yes

1.3.2   Enclosure

Form Factor	2U 19-inch Rackmount Chassis
Failed Drive Indicators	Yes
Backplane Board	SATA II
Audible Alarm	Yes
Hot-swap Drive Trays	Eight (8) 1-inch trays
Hot-Swappable Power Supplies	Two (2) 300W Power Supplies with PFC
Cooling Fans	2
UPS Connection	Yes
Environment Monitor	Monitor Temperature, Fan, Power Supply and Voltage
Power Requirements	AC 90V~264V Full Range 6A ~ 3A, 47Hz ~ 63Hz

1.3.3 Environmental

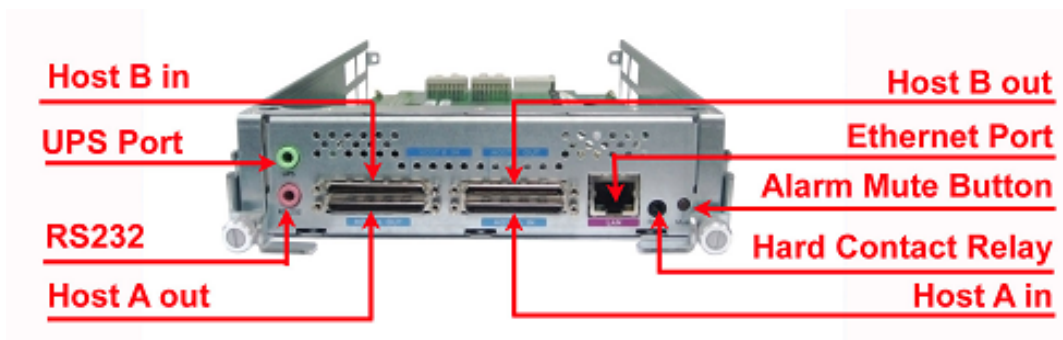| Relative Humidity	10% ~ 85% Non-condensing
Operating Temperature	10°C ~ 40°C (50°F ~ 104°F)
Weight	14 kg/30.8Lbs (without drives)
Physical Dimensions	88(H) x 482(W) x 460 (D) mm

Chapter 2   Physical Components

2.1   Controller Module

The EP-2806-SA3 includes a U320 SCSI-to-SATA II Controller Module.

2.1.1   Controller Module Panel

The Controller Module has 6 major parts: Host Channel, UPS Port, RS-232 Port, Ethernet Port, Alarm Mute Button, and a Hard Contact Relay. These parts are described as follows:

1. **Host Channel**
    The subsystem is equipped with 2 host channels (Host channel A and Host channel B), with two 68-pin SCSI connectors at the rear of the subsystem, for SCSI in and out.

2. **Uninterrupted Power Supply (UPS) Port**
    The subsystem may come with an optional UPS port allowing you to connect a UPS device. Connect the cable from the UPS device to the UPS port located at the rear of the subsystem. This will automatically allow the subsystem to use the functions and features of the UPS.

3. **RS-232 Port**
   The subsystem is equipped with a serial monitor port allowing you to connect to a PC or terminal.

   Below are the RS-232 settings.

Settings	
Baud Rate	115200
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

4. **R-Link Port : Remote Link through RJ-45 Ethernet for remote management**
   The subsystem is equipped with one 10/100 Ethernet RJ45 LAN port. You can use Java-based browser to manage the RAID subsystem through Ethernet for remote configuration and monitoring.

   Link LED: Green LED indicates Ethernet is linking.
   Access LED: The LED will blink orange when the 100Mbps Ethernet is being accessed.
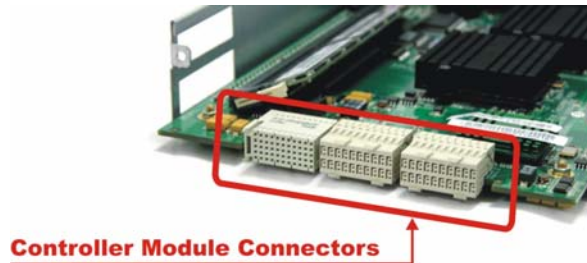
5. **Alarm Mute Button**
   When the audible alarm is sounding, press this button to mute the audible alarm.

6. **Hard Contact Relay**

2.1.2 Controller Module Installation

In this section, you will be shown how to install the Controller Module.

a. Check for damage, especially to the connectors at the rear of the Controller Module.

Controller Module Connectors

CAUTION! Handle the module with care and avoid damaging the connectors. Do not install the module if the connectors are damaged.

b. With the Controller handle in the open position, carefully insert the module into the enclosure.

c. Manually close the handle to complete the Controller Module installation.

d. Tighten the thumb screws on the handle to secure the Controller Module to the enclosure.

2.1.3 Controller Board Replacement

> 📝 **NOTE: It is necessary to use ESD anti-static device when handling sensitive parts of the controller module.**

1. Loosen the thumb screws. Raise the controller handle and pull out the controller module until it moves out of the slot.

2. Release the memory module lock and remove the memory module.

3. Remove four screws at the bottom of the controller module. Note that there are four hex screws supporting the controller board to the module case.
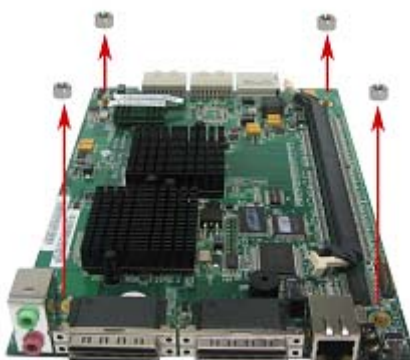

4. Remove the eight (8) lock nut screws at the front panel.

5. Remove the controller board from the module case.

6. Remove the four hex nut screws.

7. Replace the controller board.

2.2 Power Supply / Fan Module

Every EP-2806-SA3 contains **two 300W Power Supply / Fan Modules**. All PSFMs are inserted into the rear of the chassis.

2.2.1 PSFM Panel

At the panel of the Power Supply/Fan Module, there are three distinct features: the Power On/Off Switch, the AC Inlet Plug, and a Power On/Fail Indicator showing the Power Status LED, indicating ready or fail.

Each fan within a PSFM is powered independently of the power supply within the same PSFM. So if the power supply of a PSFM fails, the fan associated with that PSFM will continue to operate and cool the enclosure.

2.2.2 Power Supply Module LED

When the power cord connected from main power source is inserted to the AC Power Inlet, the power status LED becomes RED. When the switch of the PSFM is turned on, the LED will turn GREEN. When the Power On/Fail LED is GREEN, the PSFM is functioning normally.

2.2.3 Fan of PSFM

Each PSFM has 1 Master Fan.
The Master Fan is located beside the PSFM panel.

Master Fan

NOTE: In the LCD display, Master Fan of Power Supply Unit A is shown as "MF/PSU-A. Master Fan of Power Supply Unit B is "MF/PSU-B".

2.2.4 Power Supply Installation

This section describes how to install the Power Supply.

a. Check for damage, especially to the PCB Golden Fingers at the rear of the Power Supply.

CAUTION! Handle the module with care and avoid damaging the Golden Fingers. In addition, make sure there are no fingerprints on the Golden Fingers. Do not install the module if the Golden Fingers are damaged.

b. With the Power Supply handle in the open position, carefully insert the module into the enclosure.

CAUTION! When inserting the PSFM, make sure the PSFM position is correct (the handle is in the lower part when closed).

c.   Manually close the Power Supply handle.

IMPORTANT! To secure the Power Supply to the enclosure, tighten the thumb screws.

d.   Connect the Power Supply cord from the power source to the AC Power Inlet.

IMPORTANT! For safety reasons, make sure the power switches are turned off when you plug-in the power cords. When removing the power cords, ensure that the switch on the back of each power supply fan module are turned off and the power on/fail LED are red.

2.2.5 Fan Replacement

1. Remove the Power Supply Fan Module from the enclosure.
2. Unscrew 6 screws; 2 from left side, 2 from right side and 2 from top cover.

3. Pull up the top cover.

4. Disconnect the fan cable.

5. Unscrew the 4 screws of the power supply fan. Then remove the metal brace.

6. Remove the fan and replace.

2.3   Drive Carrier Module

The Drive Carrier Module houses a 3.5 inch hard disk drive. It is designed for maximum airflow and incorporates a carrier locking mechanism to prevent unauthorized access to the HDD.


2.3.1   Disk drive Indicators

Every Drive Carrier has 2 status indicator lights. One indicator light is used for Power On/Error. When this light is **GREEN** the power is on and everything is functioning normally. When the Power On/Error light is **ORANGE**, then an error has occur that requires the user's attention.

The other status indicator light is the hard disk drive access light. When the hard disk drive is being accessed, this light will **flash BLUE**.

In addition, both indicator lights are viewable within a 170° arc.
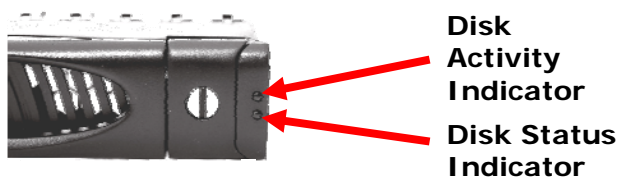
2.3.2 Lock Indicator

Every Drive Carrier is lockable and is fitted with a lock indicator to indicate whether or not the carrier is locked into the chassis or not. Each carrier is also fitted with an ergonomic handle for easy carrier removal.

Drive Carrier is Unlocked
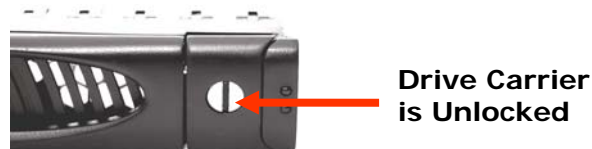
When the Lock Groove is vertical, then the Drive Carrier is unlocked.


Drive Carrier is locked

When the Lock Groove is horizontal, this indicates that the Drive Carrier is locked.

2.3.3 Disk Drive Installation

This section describes the physical locations of the hard drives supported by the subsystem and give instructions on installing a hard drive. The subsystem supports hot-swapping allowing you to install or replace a hard drive while the subsystem is running.

a. Make sure the Lock Groove is in unlocked position. Press the carrier open button and the Drive Carrier handle will flip open.
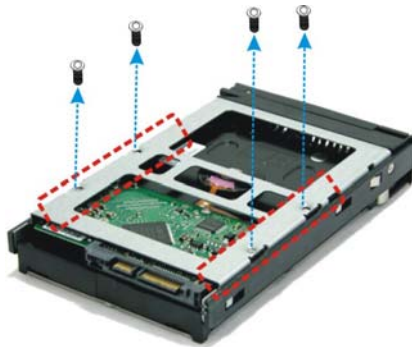

Carrier Open Button
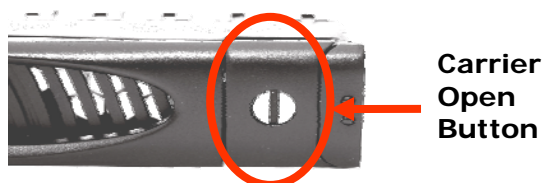
b. Pull out an empty disk tray. Pull the handle outwards to remove the carrier from the enclosure.

c. Place the hard drive in the disk tray. Make sure the holes of the disk tray align with the holes of the hard drive.

d. Install the mounting screws on the bottom part to secure the drive in the disk tray.

e. Slide the tray into a slot until it reaches a full stop.

f. Press the lever in until you hear the latch click into place. The HDD status LED will turn green on the front panel if the subsystem is on.
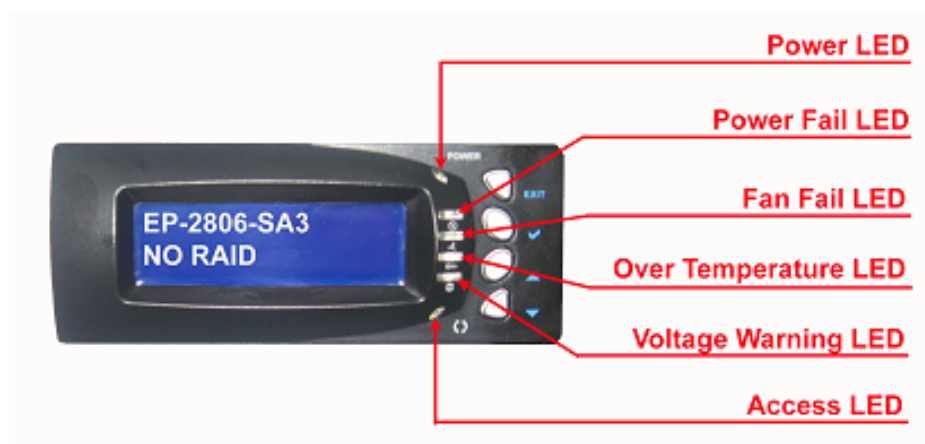
2.4 LCD Display Panel

The LCD Display Panel is located at the upper right side of the system.

2.4.1 LCD Display Panel LEDs

Environmental Status

Parts	Function
Power LED	Green indicates power is ON.
Power Fail LED	If one of the redundant power supply unit fail, this LED will turn to RED and alarm will sound.
Fan Fail LED	Turns RED when a fan's speed is lower than 2000 RPM or fan fails.
Over Temperature LED	If system temperature is over 70°C or disk temperatures exceed 55°C the temperature LED will turn RED and alarm will sound.
Voltage Warning LED	This LED will turn RED and an alarm will sound if detected voltage in the controller is abnormal.
Access LED	This LED will blink blue when the RAID controller is busy / active.

2.4.2 LCD Front Panel Function Keys

Parts	Functions
Up and Down ▲ Arrow buttons ▼	Use the Up or Down arrow keys to go through the information on the LCD screen. This is also used to move between each menu when you configure the subsystem.
Select button ✔	This is used to enter the option you have selected.
Exit button **EXIT**	Press this button to return to the previous menu.

2.5 Rackmount Slide Rail Installation

An optional Rail box can be purchased and included in the shipping package. Verify if the content of the Rail Box is complete.

2 x Rack Rails	
2 x Inner Brackets	
4 x M5*P0.8 L=25mm Long Screws	
8 x M5*0.8 L=8.0mm Round Head Screws	
12 x M4*0.7 L=6.0mm Flat Head Screws	

NOTE: To lighten the weight of the RAID system, remove the disk trays with disk drives from the chassis.

1. Remove one screw (lower part) from the RAID system ear.

2. Place one inner bracket to the side of the chassis. Align the holes on the front side of the inner rail to the holes on the RAID system ear. Tighten the screw that was removed in Step1.

3. Use four M4 flat head screws to attach the inner bracket to one of the side. Make sure the holes of the inner bracket are aligned to the holes on the side of the RAID system.

4. Repeat Steps 1 to 3 for the other inner bracket on the left side.

5. Loosen eight M4 screws on each of the rack rails. Make the necessary adjustment on the length of the rack rails to conform to the depth of the rack. Then screw the M4 screws back to the rack rails.
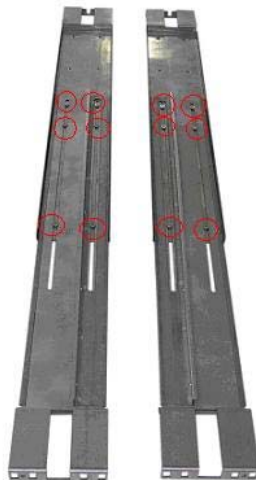
6. Place the right side rack rail on the rack cabinet. Use four M5 round head screws to fix the rack rail to the rack post (Front Right and Rear Right).

> **NOTE: In the Front Right part of the rack rail, the M5 screws must be placed in holes 1 and 3. In the Rear Right part, the M5 screws must be placed in holes 1 and 4.**
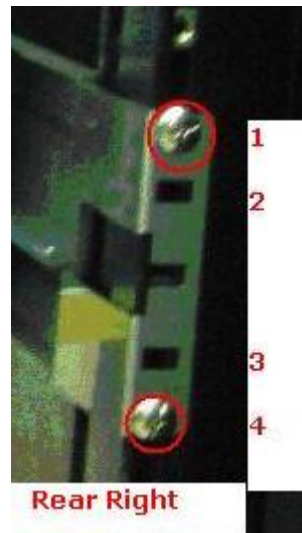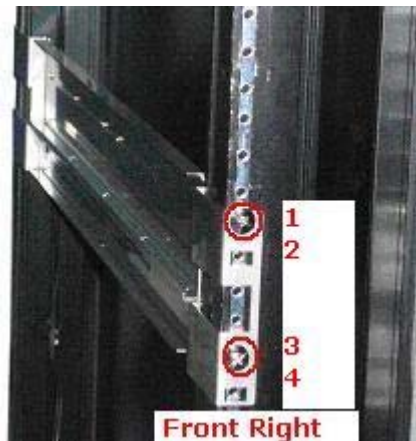
7. Repeat Step 6 to fix the left side rack rail to the rack post (Front Left and Rear Left). Take note of the positioning of the M5 screws in the holes.
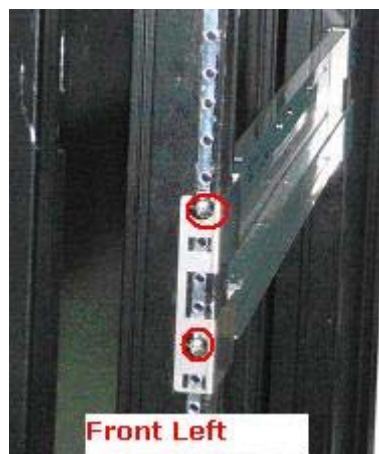
8. Carefully insert the RAID system into the cabinet. Make sure the inner brackets align with the center opening of the rack rails.
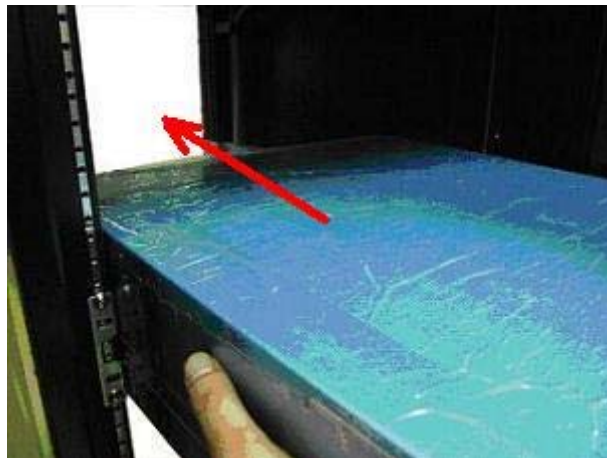
Front View

Rear View

9. Use two M5 long screws to fix the RAID system in the cabinet.

10. Insert the disk trays with disk drives, if they were removed prior to installation.

Chapter 3   Getting Started with the Subsystem

3.1   Connecting the RAID Subsystem to the Host
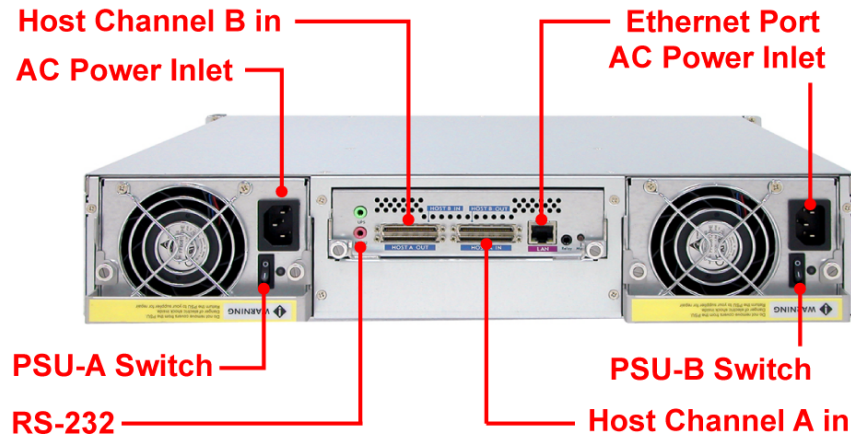
The subsystem supports Ultra 320 SCSI LVD interface which provides fast 320MB/S data transfer rates using a 16-bit SCSI bus. Installation of the disk array is very similar to the installation of a standard SCSI drive. The SCSI connector accepts the standard 68-pin LVD SCSI connector used on most LVD SCSI devices. Refer to your system and/or SCSI host adapter manual for additional installation procedures that may apply to your system or host adapter.

1.   Connect the power cables to the AC Power inlets.

2.   Connect the Ethernet cable to the RAID subsystem's Ethernet port.

3.   Connect the external serial cable to the controller's RS-232 Port (phone jack type).

4.   Connect the other end of the external serial cable to the RS-232 Port (DB9 type) on your host system.

5.   The package comes with two external SCSI cables. For every pair of host channel SCSI connector at the rear of the subsystem, attach one end of the external SCSI cable to one of the SCSI Host Channel connectors and the other end to the host adapter's external SCSI connector. (The host adapter is installed in your host system.)

6.   Attach a SCSI terminator to the other SCSI Host Channel connector (Host Channel Out port). Make sure to tighten the lock screws of the SCSI terminator.

7.   Connect the other host system using the other external SCSI cable if you want to configure subsystem into multi-host attachment.

NOTE: When one or more SCSI devices are connected, the total length of all cables (internal or external) must not exceed 3 meters (9.8 ft.) to ensure reliable operation.

IMPORTANT: For safety reasons, make sure the Disk Array and Host Computer are turned off when you plug-in the SCSI cable.

Chapter 4   RAID Concepts
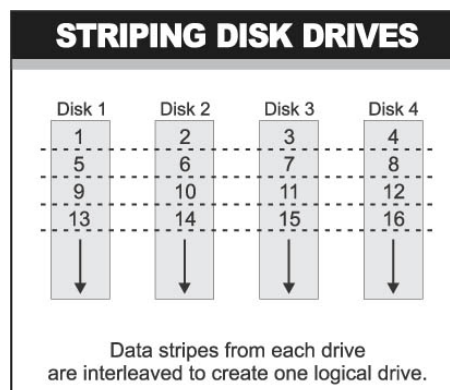
4.1   RAID Fundamentals

The basic idea of RAID (Redundant Array of Independent Disks) is to combine multiple inexpensive disk drives into an array of disk drives to obtain performance, capacity and reliability that exceeds that of a single large drive. The array of drives appears to the host computer as a single logical drive.

Five types of array architectures, RAID 1 through RAID 6, were originally defined; each provides disk fault-tolerance with different compromises in features and performance. In addition to these five redundant array architectures, it has become popular to refer to a non-redundant array of disk drives as a RAID 0 arrays.

Disk Striping

Fundamental to RAID technology is striping. This is a method of combining multiple drives into one logical storage unit. Striping partitions the storage space of each drive into stripes, which can be as small as one sector (512 bytes) or as large as several megabytes. These stripes are then interleaved in a rotating sequence, so that the combined space is composed alternately of stripes from each drive. The specific type of operating environment determines whether large or small stripes should be used.

Most operating systems today support concurrent disk I/O operations across multiple drives. However, in order to maximize throughput for the disk subsystem, the I/O load must be balanced across all the drives so that each drive can be kept busy as much as possible. In a multiple drive system without striping, the disk I/O load is never perfectly balanced. Some drives will contain data files that are frequently accessed and some drives will rarely be accessed.

STRIPING DISK DRIVES

Disk 1	Disk 2	Disk 3	Disk 4
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

Data stripes from each drive
are interleaved to create one logical drive.

By striping the drives in the array with stripes large enough so that each record falls entirely within one stripe, most records can be evenly distributed across all drives. This keeps all drives in the array busy during heavy load situations. This situation allows all drives to work concurrently on different I/O operations, and thus maximize the number of simultaneous I/O operations that can be performed by the array.

Definition of RAID Levels

**RAID 0** is typically defined as a group of striped disk drives without parity or data redundancy. RAID 0 arrays can be configured with large stripes for multi-user environments or small stripes for single-user systems that access long sequential records. RAID 0 arrays deliver the best data storage efficiency and performance of any array type. The disadvantage is that if one drive in a RAID 0 array fails, the entire array fails.
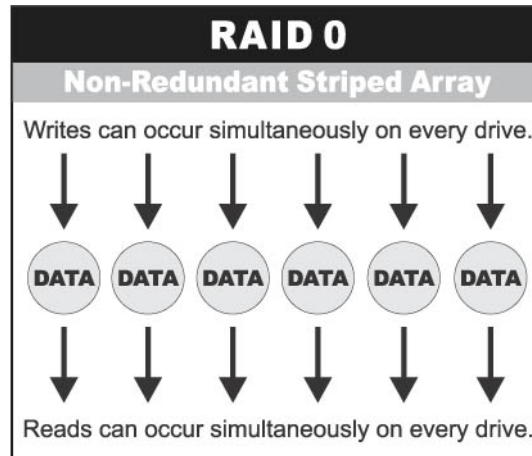
RAID 1, also known as disk mirroring, is simply a pair of disk drives that store duplicate data but appear to the computer as a single drive. Although striping is not used within a single mirrored drive pair, multiple RAID 1 arrays can be striped together to create a single large array consisting of pairs of mirrored drives. All writes must go to both drives of a mirrored pair so that the information on the drives is kept identical. However, each individual drive can perform simultaneous, independent read operations. Mirroring thus doubles the read performance of a single non-mirrored drive and while the write performance is unchanged. RAID 1 delivers the best performance of any redundant array type. In addition, there is less performance degradation during drive failure than in RAID 5 arrays.
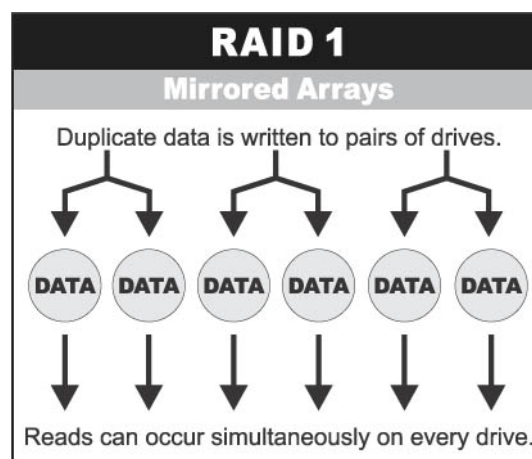
RAID 3 sector-stripes data across groups of drives, but one drive in the group is dedicated to storing parity information. RAID 3 relies on the embedded ECC in each sector for error detection. In the case of drive failure, data recovery is accomplished by calculating the exclusive OR (XOR) of the information recorded on the remaining drives. Records typically span all drives, which optimizes the disk transfer rate. Because each I/O request accesses every drive in the array, RAID 3 arrays can satisfy only one I/O request at a time. RAID 3 delivers the best performance for single-user, single-tasking environments with long records. Synchronized-spindle drives are required for RAID 3 arrays in order to avoid performance degradation with short records. RAID 5 arrays with small stripes can yield similar performance to RAID 3 arrays.
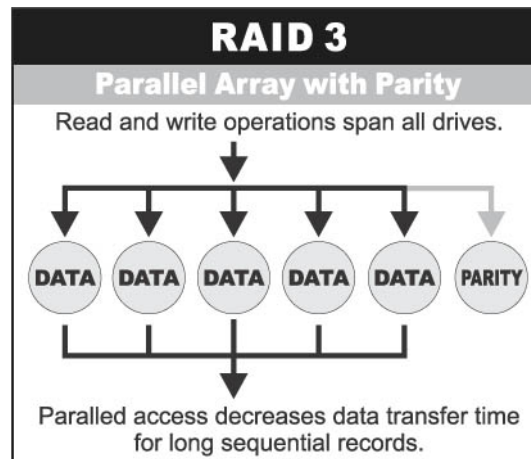
Under **RAID 5** parity information is distributed across all the drives. Since there is no dedicated parity drive, all drives contain data and read operations can be overlapped on every drive in the array. Write operations will typically access one data drive and one parity drive. However, because different records store their parity on different drives, write operations can usually be overlapped.
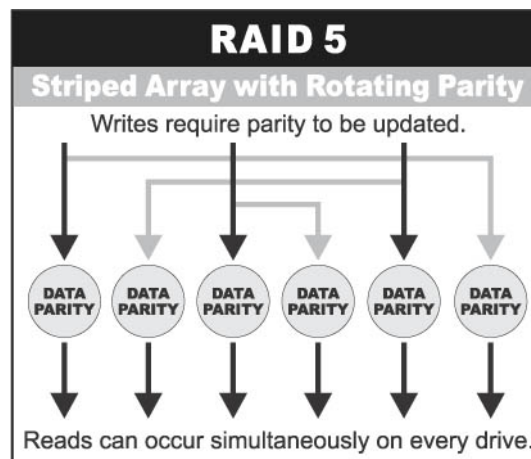
Dual-level RAID achieves a balance between the increased data availability inherent in RAID 1 and RAID 5 and the increased read performance inherent in disk striping (RAID 0). These arrays are sometimes referred to as RAID 0+1 or RAID 10 and RAID 0+5 or RAID 50.

RAID 6 is similar to RAID 5 in that data protection is achieved by writing parity information to the physical drives in the array. With RAID 6, however, *two* sets of parity data are used. These two sets are different, and each set occupies a capacity equivalent to that of one of the constituent drives. The main advantage of RAID 6 is High data availability – any two drives can fail without loss of critical data.
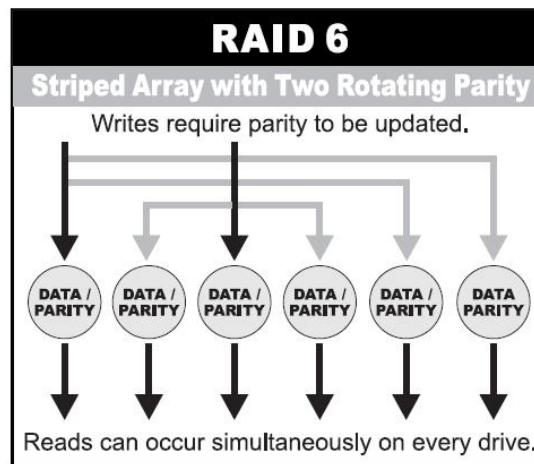
In summary:

- RAID 0 is the fastest and most efficient array type but offers no fault-tolerance. RAID 0 requires a minimum of two drives.

- RAID 1 is the best choice for performance-critical, fault-tolerant environments. RAID 1 is the only choice for fault-tolerance if no more than two drives are used.

- RAID 3 can be used to speed up data transfer and provide fault-tolerance in single-user environments that access long sequential records. However, RAID 3 does not allow overlapping of multiple I/O operations and requires synchronized-spindle drives to avoid performance degradation with short records. RAID 5 with a small stripe size offers similar performance.

- RAID 5 combines efficient, fault-tolerant data storage with good performance characteristics. However, write performance and performance during drive failure is slower than with RAID 1. Rebuild operations also require more time than with RAID 1 because parity information is also reconstructed. At least three drives are required for RAID 5 arrays.

- RAID 6 is essentially an extension of RAID level 5 which allows for additional fault tolerance by using a second independent distributed parity scheme (two-dimensional parity). Data is striped on a block level across a set of drives, just like in RAID 5, and a second set of parity is calculated and written across all the drives; RAID 6 provides for an extremely high data fault tolerance and can sustain multiple simultaneous drive failures. It is a perfect solution for mission critical applications.

RAID Management

The subsystem can implement several different levels of RAID technology. RAID levels supported by the subsystem are shown below.

RAID Level	Description	Min Drives
Linear	Linear is similar to RAID 0 in that it combines the capacity of all member drives. The data is written linearly starting with the first disk drive. When first disk drive becomes full, the next disk drive is used. There is no data redundancy.	1
0	Block striping is provide, which yields higher performance than with individual drives. There is no redundancy.	2
1	Drives are paired and mirrored. All data is 100% duplicated on an equivalent drive. Fully redundant.	2
3	Data is striped across several physical drives. Parity protection is used for data redundancy.	3
5	Data is striped across several physical drives. Parity protection is used for data redundancy.	3
6	Data is striped across several physical drives. Parity protection is used for data redundancy. Requires N+2 drives to implement because of two-dimensional parity scheme	4
0 + 1	Combination of RAID levels 0 and 1. This level provides striping and redundancy through mirroring.	4
30	Combination of RAID levels 0 and 3. This level is best implemented on two RAID 3 disk arrays with data striped across both disk arrays.	6
50	RAID 50 provides the features of both RAID 0 and RAID 5. RAID 50 includes both parity and disk striping across multiple drives. RAID 50 is best implemented on two RAID 5 disk arrays with data striped across both disk arrays.	6

4.2 SCSI Concepts

Before configuring the subsystem, you must first understand some basic SCSI concepts so that the subsystem and SCSI devices will function properly.

4.2.1 Multiple SCSI Format Support

The subsystem support the SCSI interface standards listed below. Note that the data bit and cable length restrictions must be followed.

SCSI Type	Data Bit	Data Rate	Cable Length
SCSI-1	8 Bits	5 MB/Sec	6 m
Fast SCSI	8 Bits	10 MB/Sec	3 m
Fast Wide SCSI	16 Bits	20 MB/Sec	3 m
Ultra SCSI	8 Bits	20 MB/Sec	1.5 m
Ultra Wide SCSI	16 Bits	40 MB/Sec	1.5 m
Ultra 2 SCSI	8 Bits	40 MB/Sec	12 m
Ultra 2 Wide SCSI	16 Bits	80 MB/Sec	12 m
Ultra 160 Wide LVD	16 Bits	160MB/Sec	12 m
Ultra 320 LVD	16 Bits	320MB/Sec	12 m

4.2.2 Host SCSI ID Selection

A SCSI ID is an identifier assigned to SCSI devices which enables them to communicate with a computer when they are attached to a host adapter via the SCSI bus. Each SCSI device, and the host adapter itself, must have a SCSI ID number (Ultra 320 LVD SCSI = 0 to 15). The ID defines each SCSI device on the SCSI bus. If there are more than one SCSI adapters in the Host system, each adapter forms a separate SCSI bus. SCSI IDs can be reused as long as the ID is assigned to a device on a separate SCSI bus. Refer to the documentation that came with your peripheral device to determine the ID and how to change it. The subsystem must be assigned a unique SCSI ID ranging from 0 to 15 for the Ultra 320 LVD SCSI host system. The default value is ID 0.

4.2.3 Terminators

Based on SCSI specifications, the SCSI bus must be terminated at both ends, meaning the devices that are connected to the ends of the SCSI bus must have their bus terminators enabled. Devices connected in the middle of the SCSI bus must have their terminators disabled. Proper termination allows data and SCSI commands to be transmitted reliably on the SCSI bus. The host adapter and the SCSI devices attached to it must be properly terminated, or they will not work reliably. Termination means that terminators are installed in the devices at each end of the bus.

> **NOTE: If your RAID subsystem is the last device on the SCSI bus, attach the terminator included in the package to the Host Channel A Out port and/or B Out port before using the subsystem.**

4.3 Disk Drive Organization

The subsystem arranges the SCSI drives connected to it as a physical drive group and logical unit (LUN).

4.3.1 Physical Drive Groups

The subsystem has up to a maximum of eight (8) individual disk drives which can be used to form a physical drive group. To calculate the total size of a particular drive group,

(Smallest disk size) x (Number of disks) = Capacity for RAID 0
(Smallest disk size) x [(Number of disks) / 2] = Capacity for RAID 1
(Smallest disk size) x [(Number of disks) - 1] = Capacity for RAID 3 or 5
(Smallest disk size) x [(Number of disks) - 2] = Capacity for RAID 6
{(Smallest disk size) x [(Number of disks in each sub-array) - 1)]} x (Number of sub-arrays) = Capacity for RAID 30 or 50

4.3.2 Logical Unit Number (LUNs)

A logical unit is a Volume assigned a LUN ID and mapped to a host channel. It appears to the host system as a logical device. Up to 32 Volumes can be mapped as LUNs in each host channel (LUN ID 0 to 31 for Host A and for Host B).

4.3.3 Hot-Swap Drive Replacement

The subsystem supports hot-swapping of drives while the system is powered on. A disk may be disconnected, removed or replaced with a different disk without turning off the system.

4.3.4 Disk Failure Detection

The subsystem can automatically detect disk failures. It monitors disk activities including the elapsed time on all commands issued to the disks as well as parity errors and other potential problems. A time-out will reset the disk and retry the command. If the command time-out occurs again, the disk will fail. Any disk with too many errors will be shut down by subsystem.

Chapter 5 Configuration Utility Options

The subsystem has a built-in setup configuration utility containing important information about the configuration as well as settings for various optional functions in the subsystem. This chapter explains how to use and make changes to the setup utility.

Configuration Methods

There are three methods of configuring the subsystem:
- VT100 terminal connected through the controller's serial port
- Front panel touch-control keypad
- Web browser-based proRAID Manager GUI

> **IMPORTANT: Only one method can be used to configure the subsystem. Two methods can be used at the same time but the other method will be in read-only mode.**
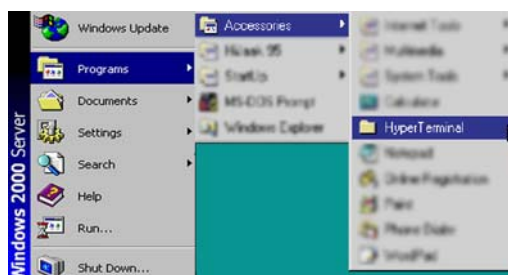
5.1 Configuration through a Terminal
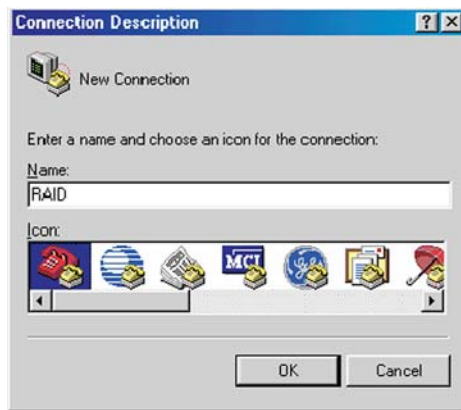
To start-up:

1. Connect a VT100 compatible terminal or a PC operating in an equivalent terminal emulation mode to the monitor port located at the rear of the subsystem.
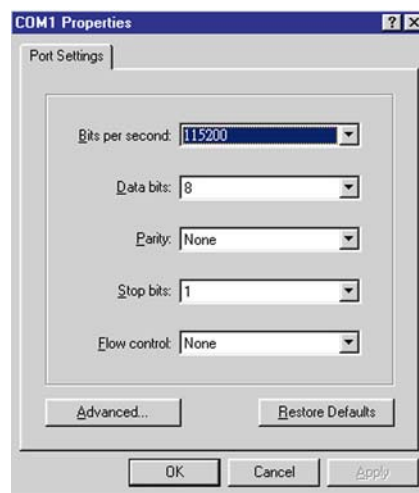
> **NOTE: You may connect a terminal while the subsystem's power is on.**

2. Power-on the terminal.

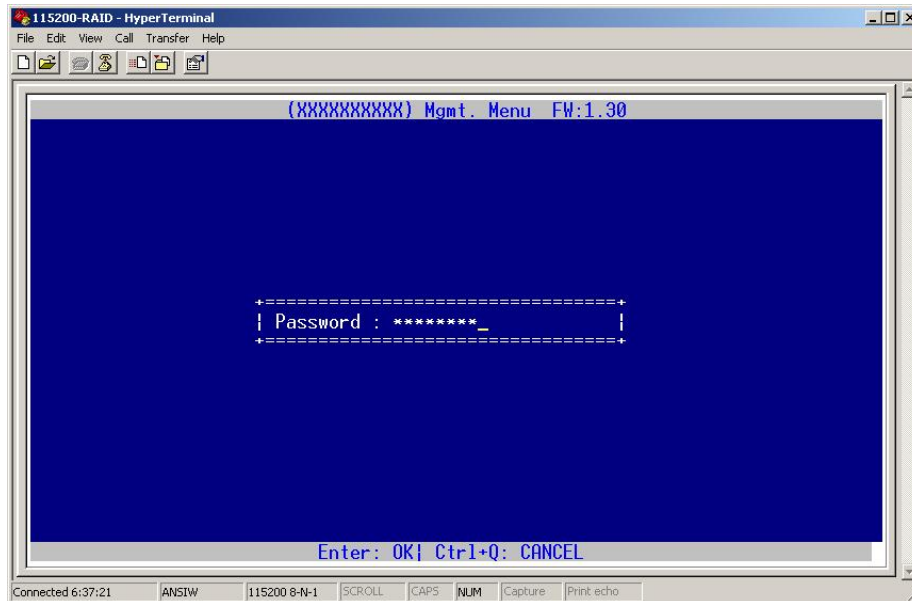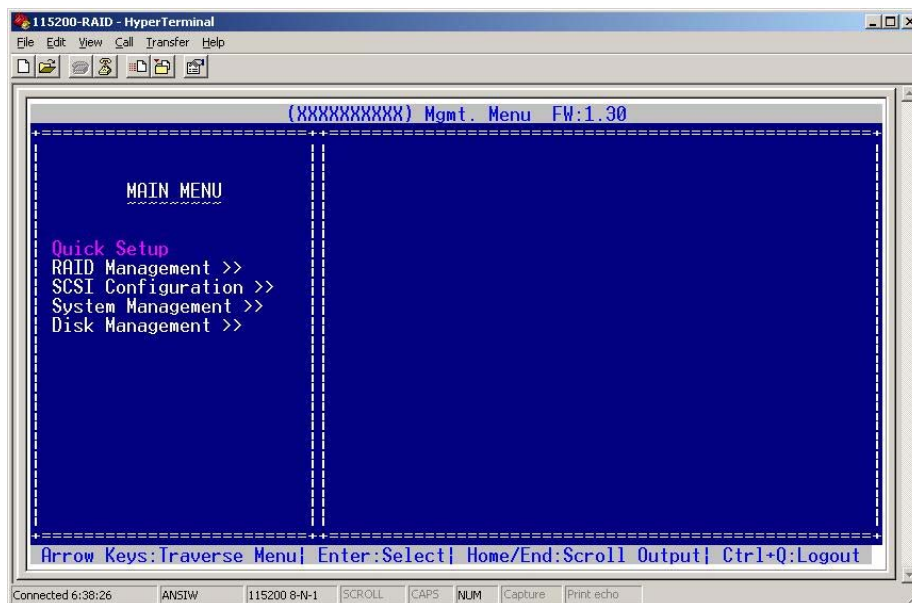3. Run the VT100 program or an equivalent terminal program.

4. The default setting of the monitor port is 115200 baud rate, 8 data bit, non-parity, 1 stop bit and no flow control.

5. After connecting and powering on the terminal. Press "I" key to enter password screen. The preset password is 8 zeroes. Type "00000000".

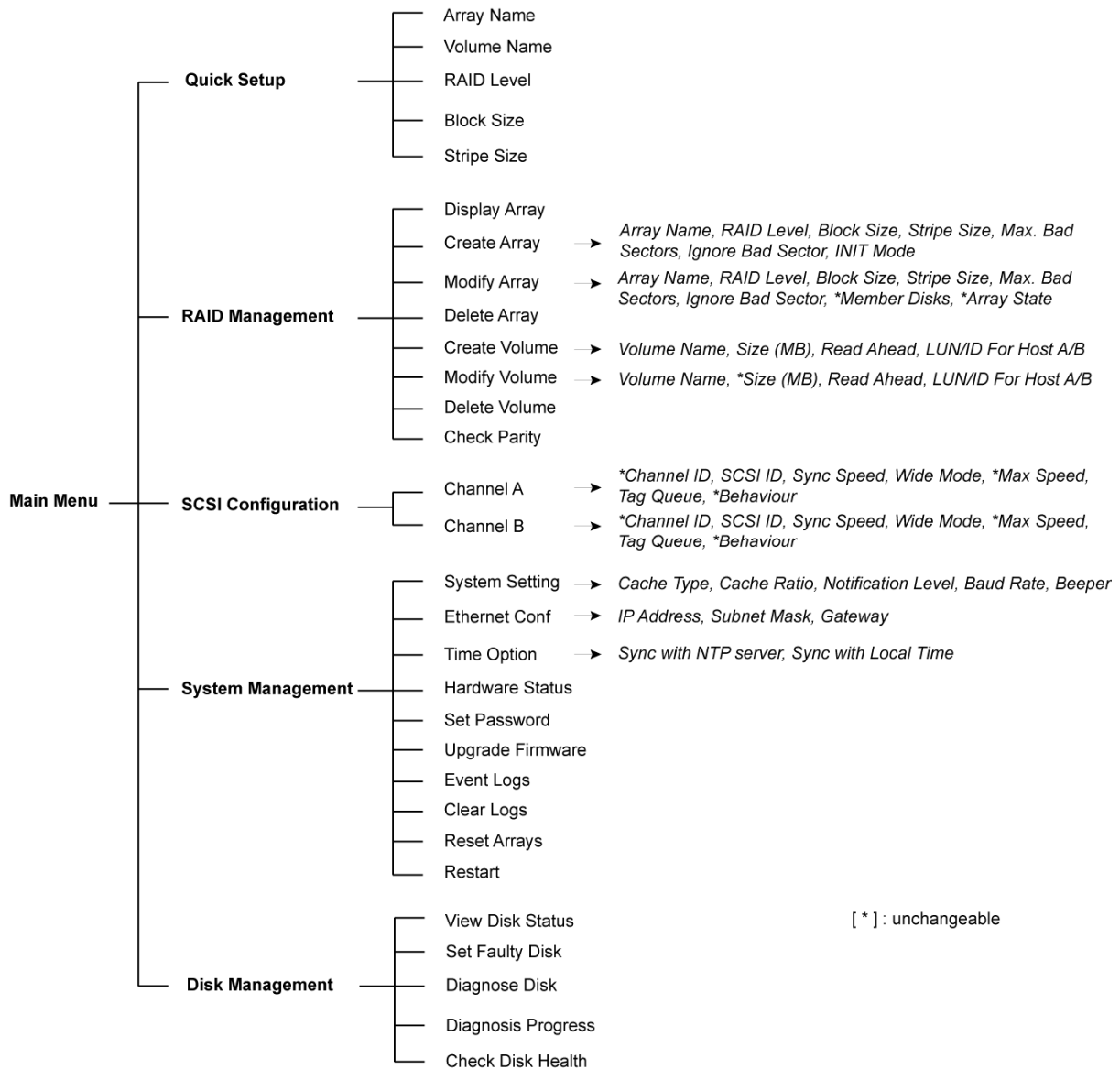6. Then press <Enter> to enter screen. The Main Menu will appear.

Keyboard Function Key Definitions

"Enter" key: to confirm a selected item

"<Ctrl> + Q" key: to exit a selection or Logout

"↑↓→←" Arrow keys: to move in / among fields or Traverse Menu

"Tab" key: to move to the next default value

VT100 terminal configuration Utility Main Menu Options

Select an option and the related information or submenu items display beneath it. The submenus for each item are listed below.

```
                                    ┌── Array Name
                                    ├── Volume Name
                    Quick Setup ────┼── RAID Level
                                    ├── Block Size
                                    └── Stripe Size

                                    ┌── Display Array
                                    ├── Create Array  ──►  Array Name, RAID Level, Block Size, Stripe Size, Max. Bad
                                    │                      Sectors, Ignore Bad Sector, INIT Mode
                                    ├── Modify Array   ──►  Array Name, RAID Level, Block Size, Stripe Size, Max. Bad
                                    │                      Sectors, Ignore Bad Sector, *Member Disks, *Array State
                    RAID Management ┼── Delete Array
                                    ├── Create Volume  ──►  Volume Name, Size (MB), Read Ahead, LUN/ID For Host A/B
                                    ├── Modify Volume  ──►  Volume Name, *Size (MB), Read Ahead, LUN/ID For Host A/B
                                    ├── Delete Volume
                                    └── Check Parity

                                    ┌── Channel A      ──►  *Channel ID, SCSI ID, Sync Speed, Wide Mode, *Max Speed,
                                    │                      Tag Queue, *Behaviour
Main Menu ──┬── SCSI Configuration ┤
            │                       └── Channel B      ──►  *Channel ID, SCSI ID, Sync Speed, Wide Mode, *Max Speed,
            │                                               Tag Queue, *Behaviour
            │
            │                       ┌── System Setting ──►  Cache Type, Cache Ratio, Notification Level, Baud Rate, Beeper
            │                       ├── Ethernet Conf  ──►  IP Address, Subnet Mask, Gateway
            │                       ├── Time Option    ──►  Sync with NTP server, Sync with Local Time
            │                       ├── Hardware Status
            ├── System Management ──┼── Set Password
            │                       ├── Upgrade Firmware
            │                       ├── Event Logs
            │                       ├── Clear Logs
            │                       ├── Reset Arrays
            │                       └── Restart

            │                       ┌── View Disk Status           [ * ] : unchangeable
            │                       ├── Set Faulty Disk
            └── Disk Management  ───┼── Diagnose Disk
                                    ├── Diagnosis Progress
                                    └── Check Disk Health
```

The configuration utility main menu options are:

Menu Option	Description
Quick Setup	Quickly create a single Array and Volume
RAID Management	Create single or multiple Arrays and Volumes with custom parameters.
SCSI Configuration	Set SCSI parameters such as SCSI ID, speed and Tag Queue.
System Management	Set System parameters such as Ethernet, Time, password, Upgrade Firmware and Event Logs
Disk Management	Set disk utility such as view disk status and set faulty.

5.1.1 Upgrading Firmware through VT-100 Terminal Emulation

The RAID controller's firmware can be upgraded through a terminal.

To upgrade the firmware, follow these steps:

1. Shut down the host computer system, if a host computer is connected.
2. Start a terminal connection to the disk array and access the Menu area.
3. From the Main Menu, scroll down to "System Management"
4. Choose the "Upgrade Firmware". The Upgrade the Raid Firmware dialog box appears.
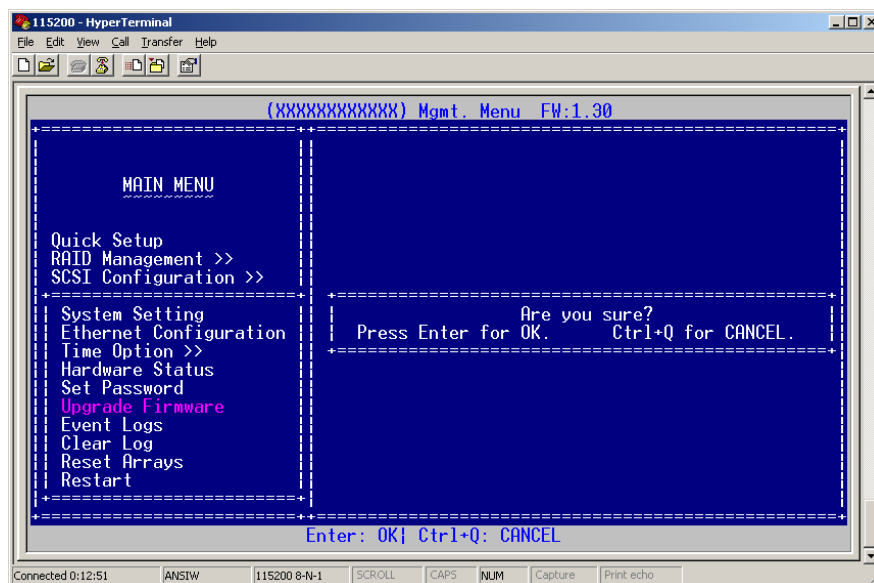
5. Press Enter to confirm. Go to the menu tool bar and select Transfer. Open Send File.
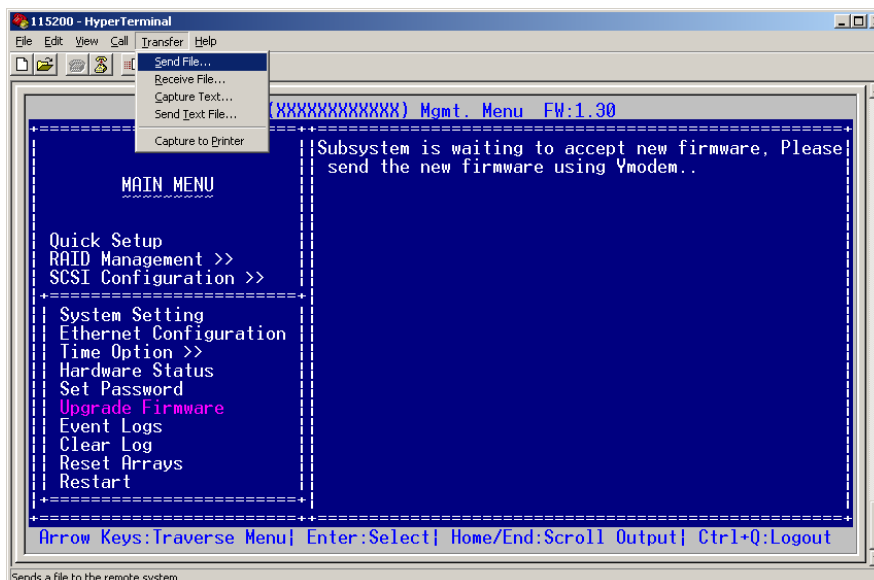
6. Click Browse. Locate where the Firmware file has been saved, select the file and click Open.
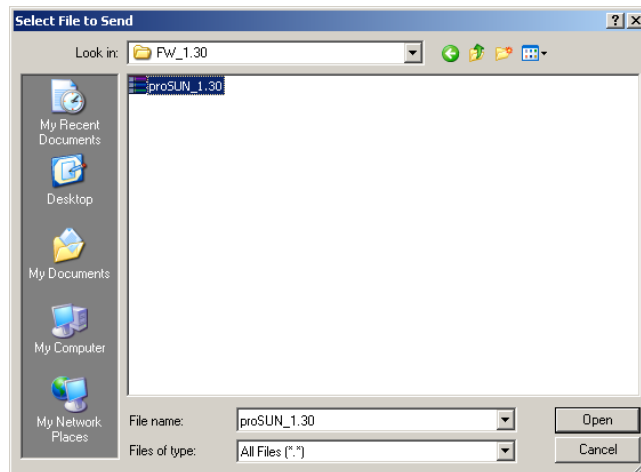
7. Select "Ymodem" under Protocol. YMODEM is the file transfer protocol used by the terminal emulation software.
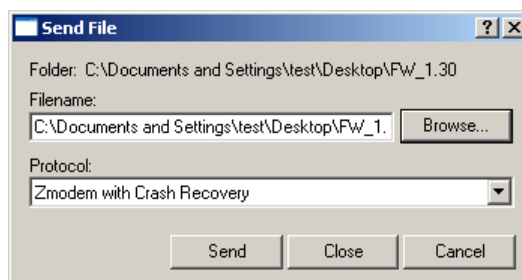
8. Click "Send" to send the Firmware file to the RAID controller.
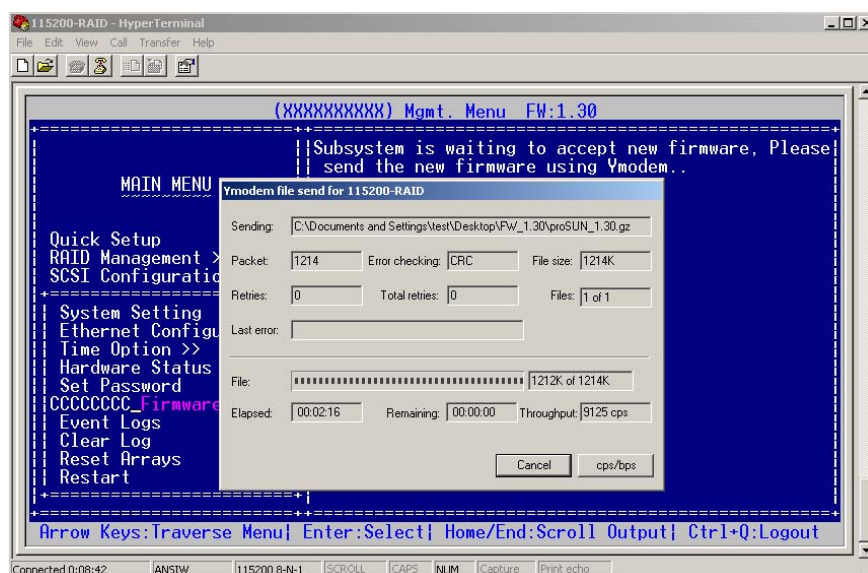
9. When Firmware download is completed, the subsystem will restart. Need to login again to terminal after restart.

5.2 Configuring the Subsystem Using the LCD Panel

All configurations can be performed through the LCD Display front panel function keys, except for the "Firmware update". The LCD provides a system of screens with areas for information, status indication, or menus. The LCD screen displays menu items or other information up to two lines at a time. The RAID subsystem password is set to **OOOOOOOO** by manufacture default.

Function Key Definitions

Parts		Function
Exit button	EXIT	Press this button to return to the previous menu.
Select button	✔	This is used to enter the option you have selected.
Up and Down arrow buttons	▲ ▼	Use the Up or Down arrow keys to move between each menu when you configure the subsystem.

The following tree diagram is a summary of the various configurations and setting functions that can be accessed through the LCD panel menus. Press the Select button and enter the password to access the menu functions.
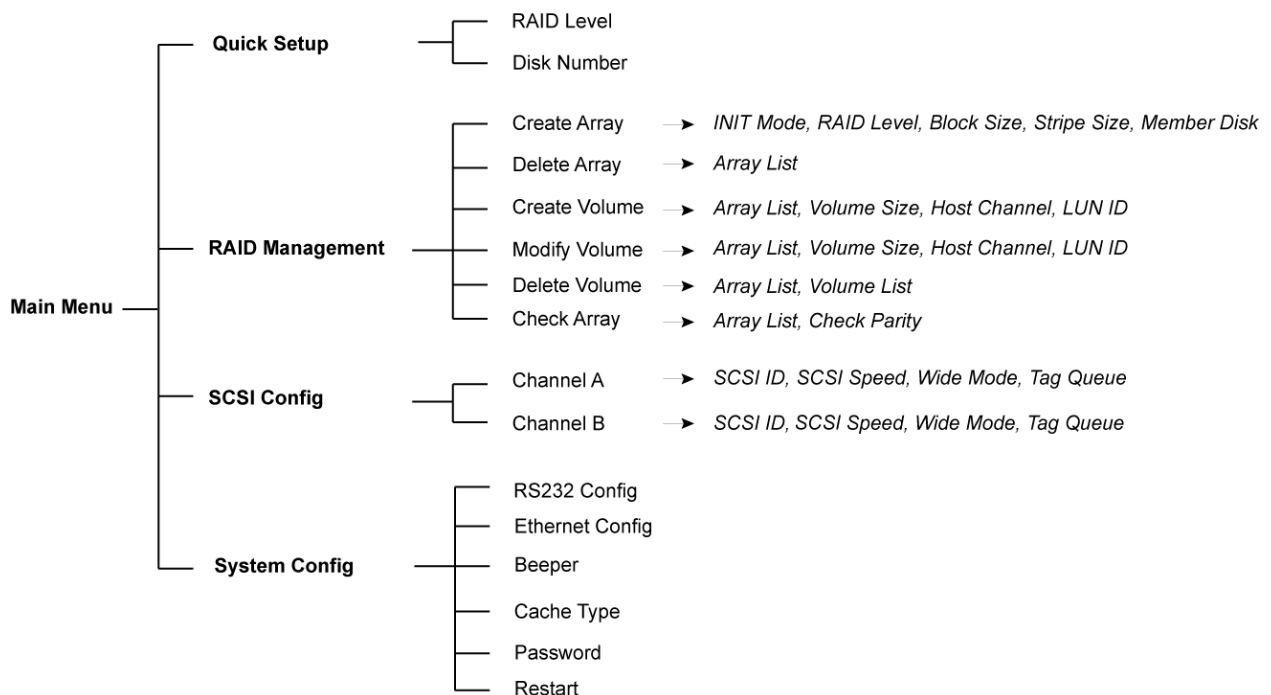
To view system information, hardware monitor information, array information, and other related information, press the Down Arrow button.

Model-Name
RAID READY

↓

IOP-80331 FW1.30
RAM:256MB HD#8

↓

Temperature
System:40 C

↓

S 1:34C S 2:31C
S 3:33C S 4:32C

↓

S 5:34C S 6:29C
S 7:29C S 8:31C

↓

MF/PSU-A: 3214rpm
MF/PSU-B: 3213rpm

↓

Array1
IN USE ARRAY > ⟶ **A: 899G Fr:399G**
Level: RAID 5

↓

Stripe Size:128K
Block Size:512 byte

↓

Member disks:
1234

↓

Vol1
Size: 499.9 GB

Disk Info
Disks: 8   > ⟶ **(shows hard disk info, such as model, capacity)**
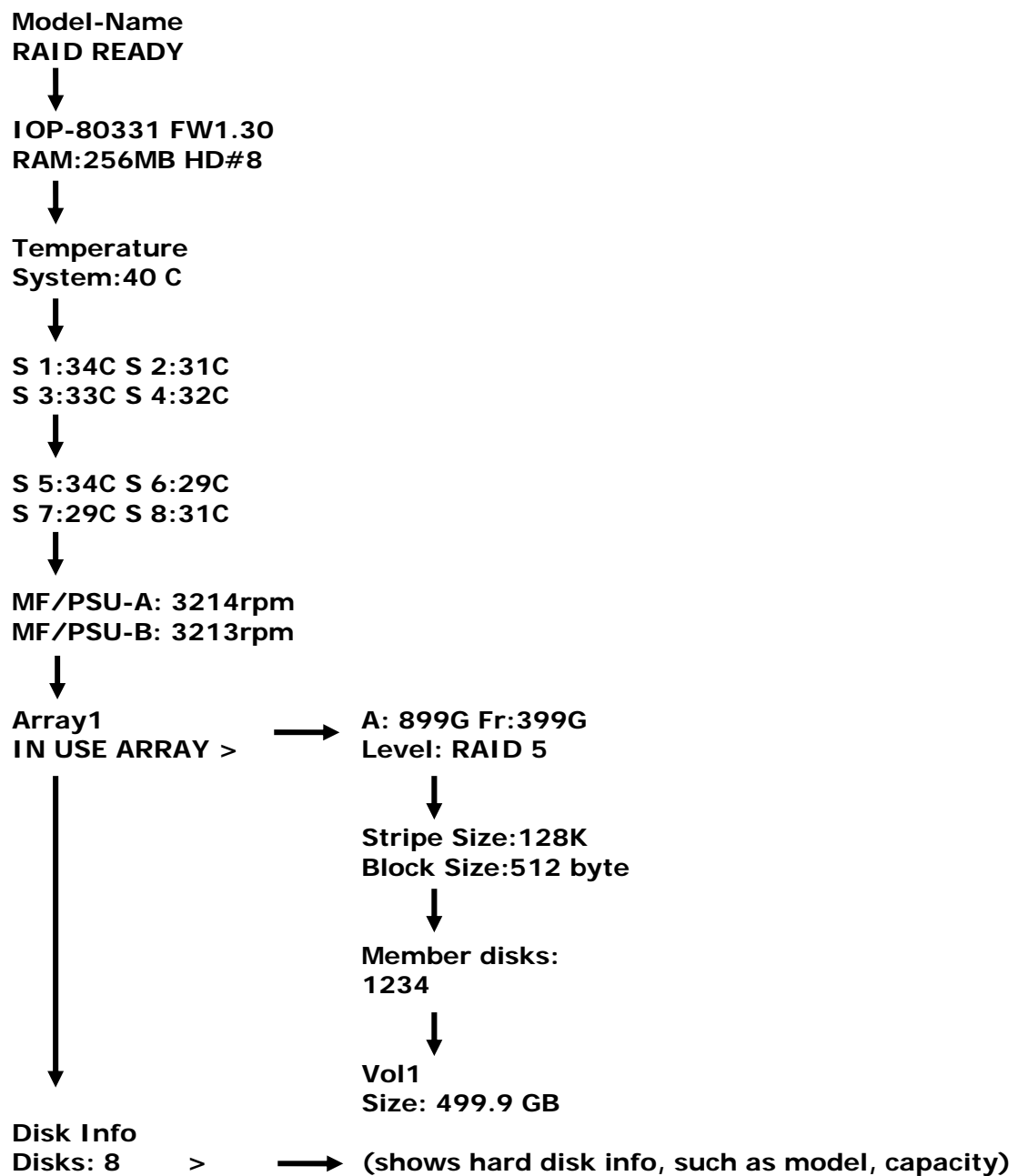
5.3   Configuration using the proRAID Manager GUI

The RAID subsystem can be managed through the controller's Ethernet connection. Any PC on the network to which the RAID subsystem is connected can manage the subsystem using proRAID Manager. proRAID Manager is web browser-based Graphical User Interface (GUI) that is supported on many OS platforms.

This chapter describes the steps that you need to start up ProRAID Manager and how to use it on your system.

> **NOTE: Flash Player 10 or later version must be installed in the PC which will be used to manage the RAID subsystem.**

5.3.1   Login to proRAID Manager

Open a web browser and enter http://xxx.xxx.xxx.xxx, where xxx.xxx.xxx.xxx is the IP address of the RAID subsystem. The Login screen will be displayed.

Enter the subsystem name (you can use any name to identify the subsystem you are going to manage) and the password.

> **NOTE: The default IP address of the RAID system is 172.16.0.1. The IP address can be verified from LCD panel; select System Config and then Ethernet Config. The default subsystem password is 00000000.**

> **NOTE: The session timeout limit is 10 minutes. When the GUI is not used within 10 minutes, user will be logged out automatically.**

5.3.2 The ProRAID Manager Main Menu

After login, the Main Screen will be displayed. There are several menu items shown on the upper part of the screen. The menu items are grouped according to their functionality.
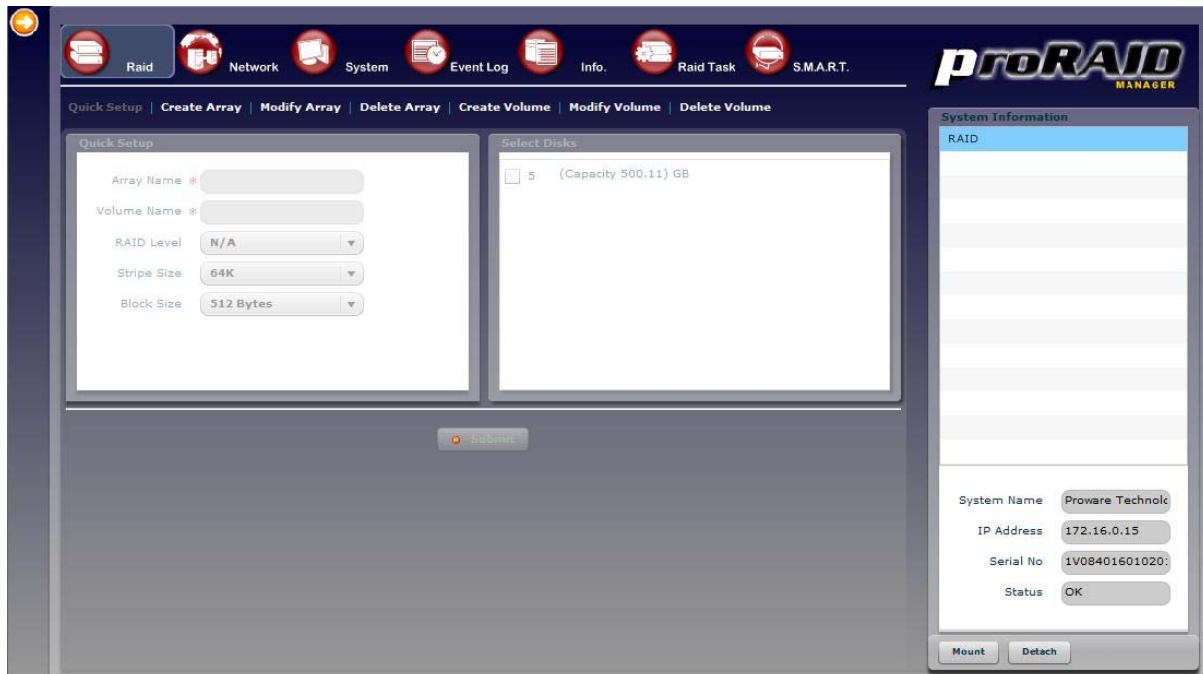
Each menu item can have several sub-menu items. Click the icon of the menu item and the sub-menu will be displayed.

The right pane shows the list of subsystems that you have logged in to. You can login to several subsystems at a time using a single proRAID Manager GUI.

On the left side of the screen is an icon ⬤ to show or hide the proRAID Manager Menu Tree. The menu tree is a list form of the menu options available on the upper part of the screen. It provides a quicker way to access the submenu items.

Mount or Detach RAID Subsystem

To login to another RAID Subsystem, click the **Mount** button and enter the **Subsystem Name** (you can use any name to identify the subsystem you are going to manage), the **IP Address**, and the subsystem **Password**. The subsystem name will appear in the list of subsystem on the right screen.

To logout from a subsystem, select the subsystem name and click **Detach**. In the confirmation screen, select OK to proceed with logout.

5.3.3 ProRAID Manager Menu Hierarchy

Below is the summary of the menu and functions available in proRAID Manager GUI.

RAID	**Quick Setup**
	Create Array
	Modify Array
	Delete Array
	Create Volume
	Modify Volume
	Delete Volume
Network	**Network Setting**
	SNMP Setting
	SMTP Setting
	NTP Setting
	Sync RTC
System	**System Setting**
	Channel Manager
	Modify Password
	Upgrade Firmware
	Restart
Event Log	**Event Log**
	Export Log
Information	**Disk Info**
	RAID
	System Info
	Hardware Monitor
Raid Task	**Raid Status**
S.M.A.R.T	**Disk Health**
	Diagnosis Disk

Chapter 6   RAID Management

This chapter describes the available RAID Management tasks; these tasks may be selected using the RAID menu icon in the upper part of the screen or in the left side menu of the ProRAID Manager screen. There are seven functions: Quick Setup, Create Array, Modify Array, Delete Array, Create Volume, Modify Volume, and Delete Volume.

> **NOTE: Any FREE or un-used hard disk will automatically become Global Hot Spare disk, which means it can replace any failed disk in any Array, as long as the capacity is the same or greater than the capacity of the smallest disk size in the Array.**

6.1   Quick Setup

The Quick Setup function provides an easy way for users to quickly configure a single Array and Volume.

Here are the steps:

1.   In Raid menu, click "Quick Setup".

2. Enter Array Name, Volume Name, select the disk drives to be included in the Array, and select RAID Level, Stripe Size, and Block Size. Click "Submit" when done.

Option	Description
Array Name	The name of the array you want to assign to the Array. It should not exceed 20 characters.
Volume Name	The name of the volume you wan to assign to the Volume. After mapping the Volume as LUN, it will appear as a disk device to the host.
RAID Level	Select the RAID Level you want the Array to use. The RAID level option will depend on the number of disk drives selected.
Stripe Size	This parameter sets the size of the stripe written to each disk. You can set the stripe size to 8k, 16k, 32k, 64k, 128k, 256k or 512k.
Block Size	Use this option to enable creating Volume over 2TB. For Windows OS, such as Windows 2000, 2003: Use **1KB**, **2KB** or **4KB.** For 64bit LBA mode, such as Windows 2003+SP1 or later versions, Linux 2.6 or later versions: Use **512 bytes**. Due to LSI chip limitation, 16 Byte CDB option must run at U320 mode.

3. The Array and Volume will be created.
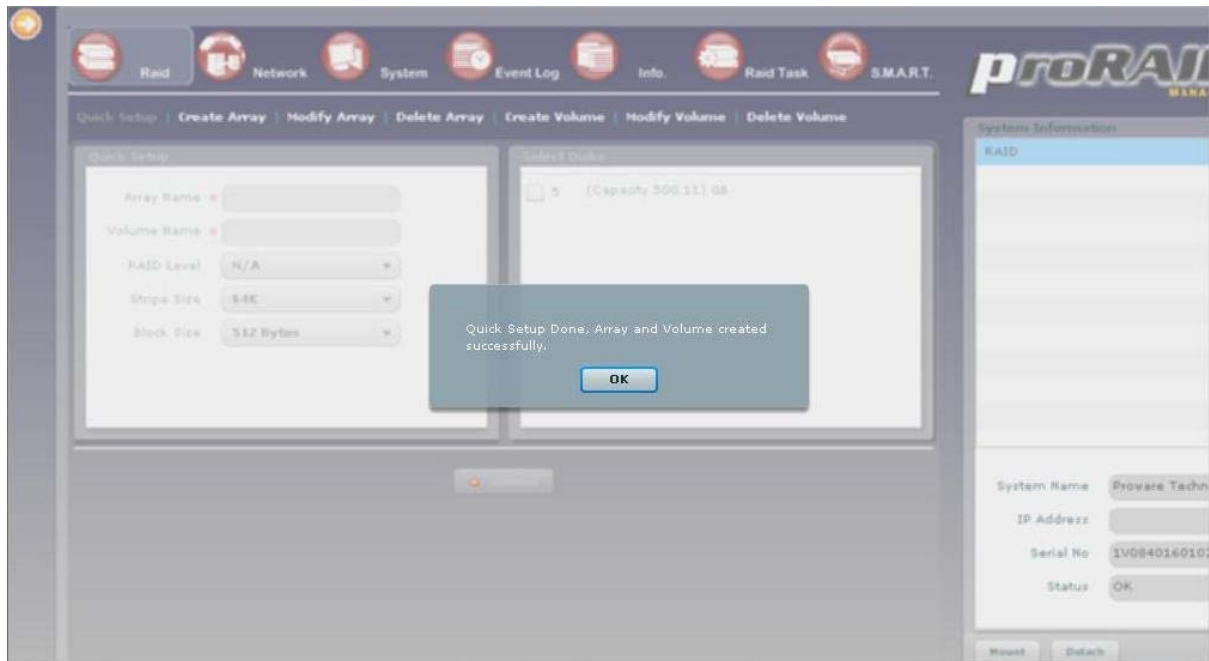
NOTE: Quick Setup can only be used if there's no existing Array.

NOTE: In Quick Setup, the Array will be created in background initialization mode, which means the Volume will be available immediately while initializing in the background.

6.2 Create Array

NOTE: The RAID subsystem supports up to 8 Arrays.

To create a new Array:

1. In RAID menu, click "Create Array".

2. Enter the Array Name, change the Re-Mapped BS count as necessary, select the disks drives to be included in the Array, and set the RAID Level, Stripe Size, Block Size, and Task Priority. Other options, such as Background Init mode and Ignore Bad Sectors, can also be set. Click "Submit" when done.

Option	Description
Array Name	The name of the array you want to assign to the Array. Maximum is 20 characters.
Capacity	The total capacity of the Array in GB.
Re-Mapped BS count	Set the maximum number of bad sector count to be remapped. Default is 1000. Maximum number of bad sector is 10,000.
RAID Level	Select the RAID Level you want the Array to use. The RAID level option will depend on the number of disk drives selected.
Stripe Size	This parameter sets the size of the stripe written to each disk. You can set the stripe size to 8k, 16k, 32k, 64k, 128k, 256k or 512k.
Block Size	Use this option to enable creating Volume over 2TB. For Windows OS, such as Windows 2000, 2003: Use **1KB**, **2KB** or **4KB.** For 64bit LBA mode, such as Windows 2003+SP1 or later versions, Linux 2.6 or later versions: Use **512 bytes**. Due to LSI chip limitation, 16 Byte CDB option must run at U320 mode.
Task Priority	The priority for background tasks, such as rebuilding. Options are: LOW, MEDIUM, and HIGH. LOW priority means less system resources are allotted to background task, and access to Array and Volume is faster. In HIGH priority, more system resources are used for background task, and access to Array and Volume is slower.
Background Init	The default Array Initialization mode is Foreground Init mode (the Background Init option is unchecked) and Volume(s) can only be added to the Array after initialization is completed. When Background Init mode is used, the Array will be accessible during initialization and Volume(s) can be created immediately. Note that accessing the Array during background initialization can have performance impact.
Ignore Bad Sectors	Use this option to Ignore Bad Sectors. This option is used when rescuing Array. It is recommended that you disable this option in normal situation.

3. The Array will be initialized.

4. The next step is to create a Volume. When Array has completed its initialization in Foreground mode, or still initializing in Background mode, a Volume can created.

NOTE: Any FREE or un-used hard disk will automatically become Global Hot Spare disk, which means it can replace any failed disk in any Array, as long as the capacity is the same or greater than the capacity of the smallest disk size in the Array.

6.3 Modify Array

Use this function to modify settings of an existing Array

To modify Array:

   i.   In RAID menu, click "Modify Array". Change the settings of the Array as necessary.
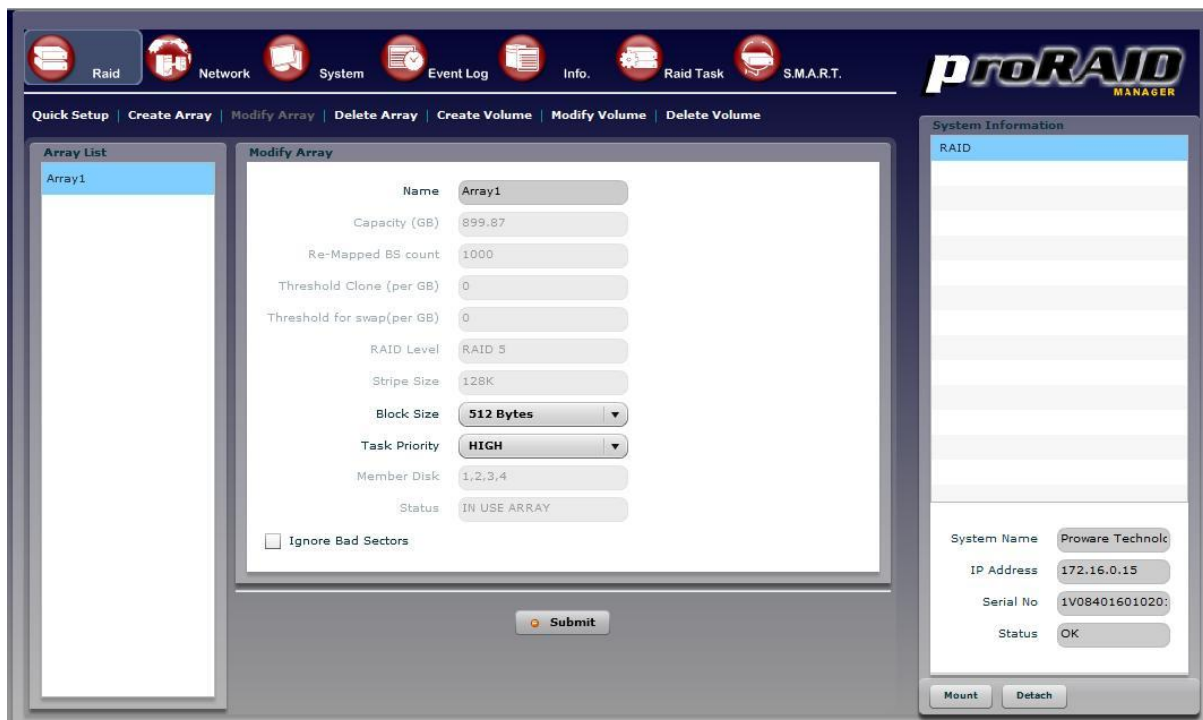
NOTE: Some settings are read-only and cannot be modified.

   ii. Click "Submit" when done. The modified Array will be saved.

6.4 Delete Array

1. To delete an Array, select "Delete Array" from RAID menu.

2. Select the Array to be deleted from the list of Arrays displayed on the left side.
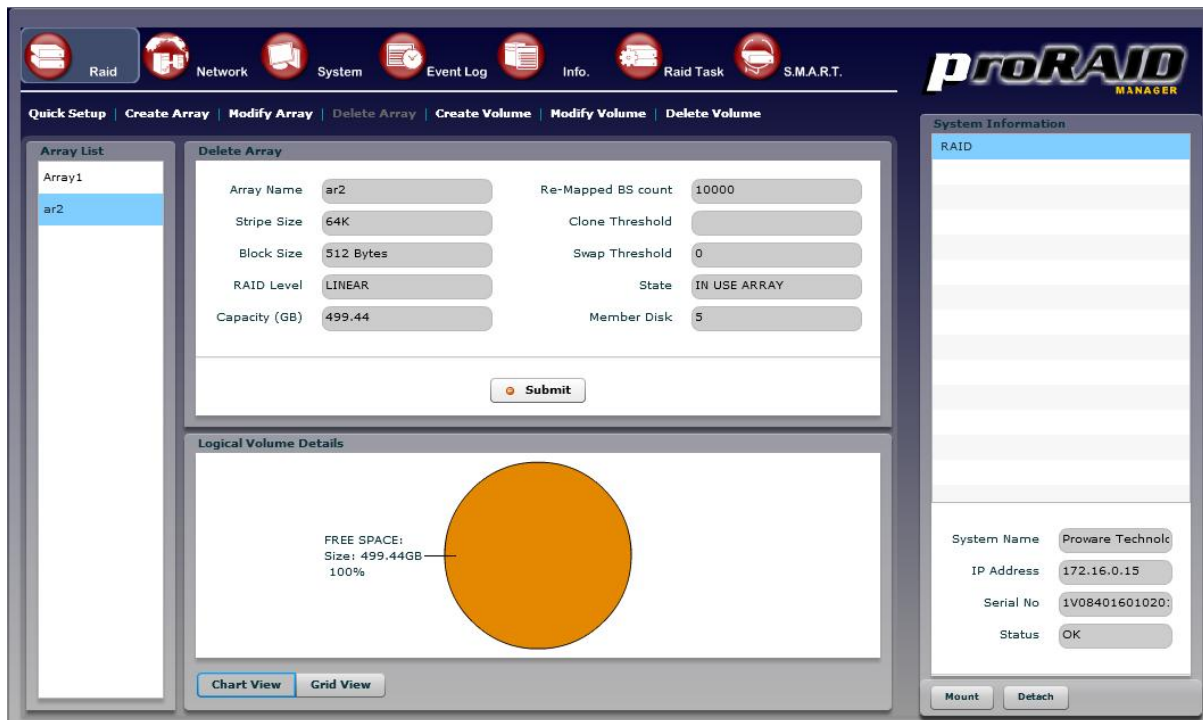
3. Click "Submit" when done. A warning message will be displayed. Click "OK" to proceed with deletion.
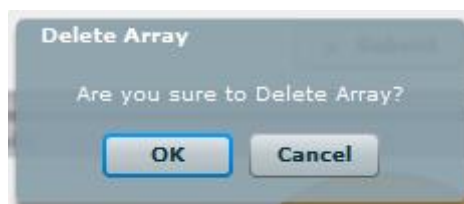
IMPORTANT: Make sure that the data in the Array to be deleted is no longer needed before deleting an Array.

6.5 Create Volume

A Volume is seen by the host system as a single logical device. Multiple Volumes can be created in an Array as long as there is free capacity in the Array. Up to 32 Volumes can be mapped to a LUN in each Host Channel (LUN ID 0 to 31 for Host A and for Host B).

1. To create a Volume, select "Create Volume" from RAID menu.

2. From the list of Array in the left column, select the Array where the Volume will be created.
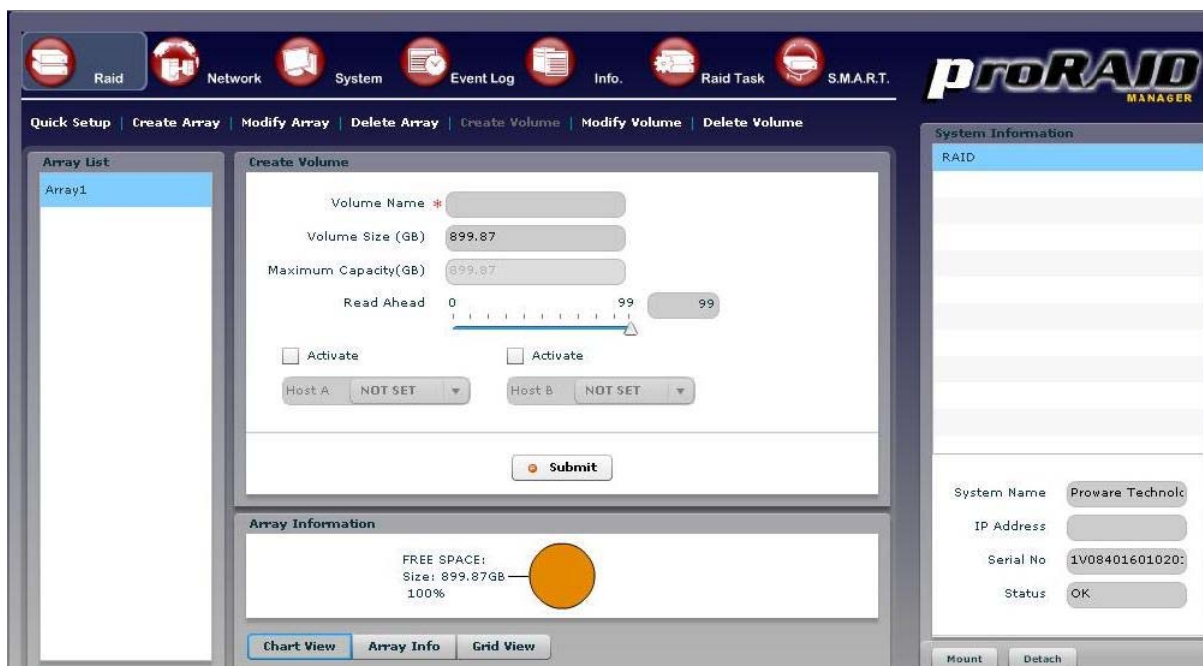
3. Enter the Volume Name, the Volume Size, and change the Read Ahead option if necessary. Map the Volume to a LUN by enabling the Activate option and selecting the LUN ID in the Host Channel.
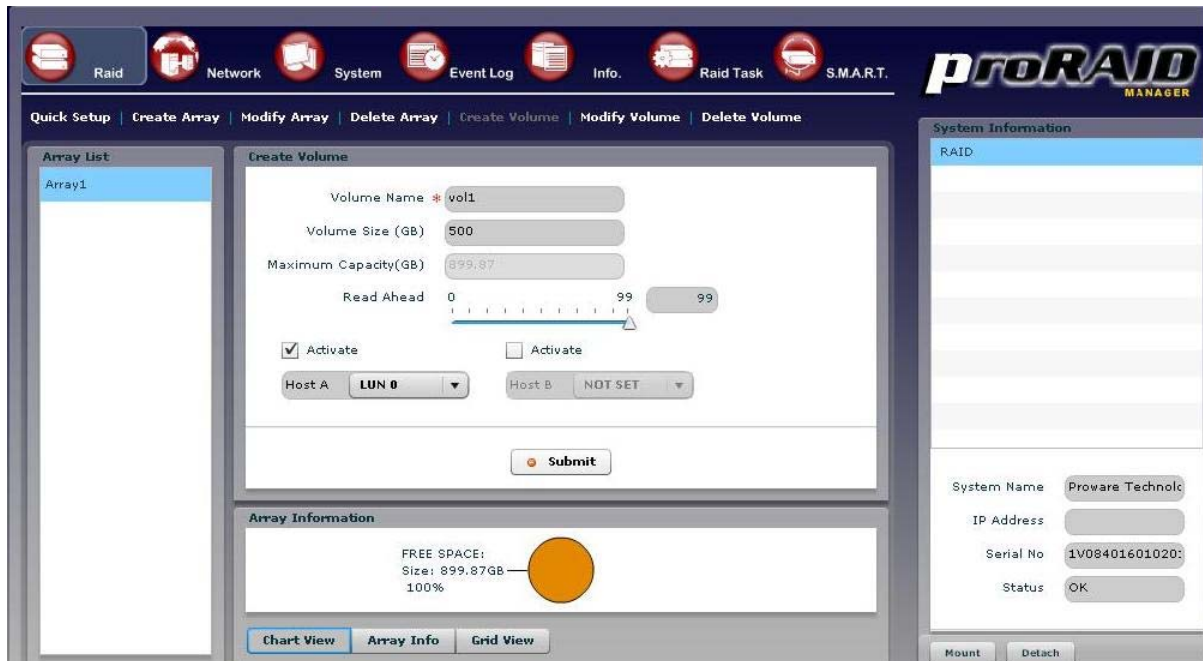
Option	Description
Volume Name	The name you want to assign to the Volume. Maximum is 20 characters.
Volume Size	The capacity you want to give to the Volume; value is in GB. Note that the available capacity that can be used in displayed in Maximum Capacity field.
Read Ahead	The Maximum number of Read Ahead is 99. The controller will read ahead to optimize performance on sequential reads.
Activate	Enable this option to activate the Volume in the selected Host Channel (A and/or B).
Host A, Host B - LUN #	The LUN ID in the Host Channel assigned to the Volume. Each Host Channel has 32 LUN IDs.

4. Click "Submit" when done. The Volume will be created.

Volume has been created successfully.

OK

IMPORTANT: Once a LUN number is already assigned to a Volume, it cannot be used again.

6.6 Modify Volume

The Volume attributes can be modified using the "Modify Volume" function in RAID menu.

To modify a Volume:

1. Select "Modify Volume" from RAID menu. Select the Array name from the Array List, and then select the Volume to be modified.

2. Change the settings as necessary. Note that some settings cannot be modified.
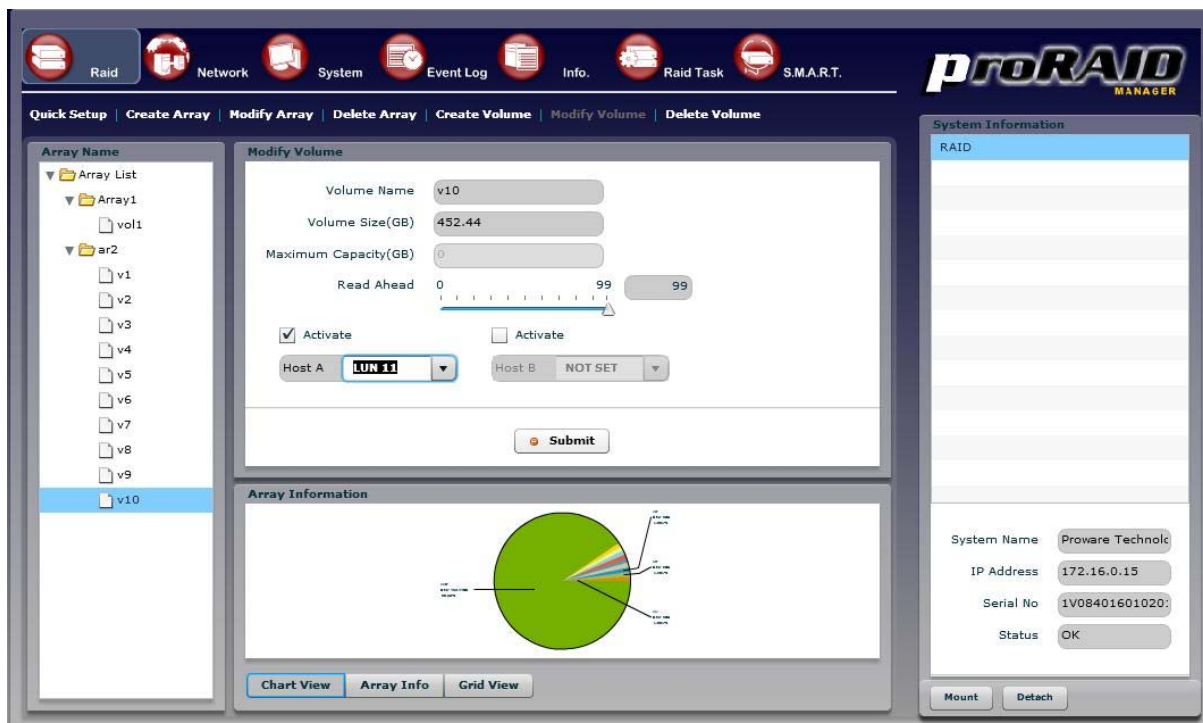
3. Click "Submit" when done. The modified Volume settings is saved.
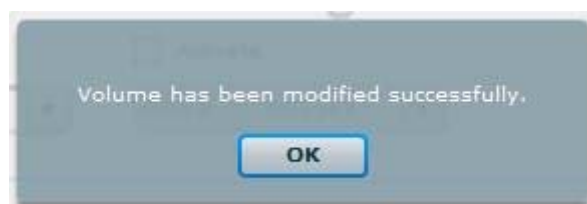
6.7 Delete Volume

To delete a Volume:

1. Select "Delete Volume" from RAID menu. From the Array List, select the Array name which contains the Volume to be deleted. Then select the Volume to be deleted.
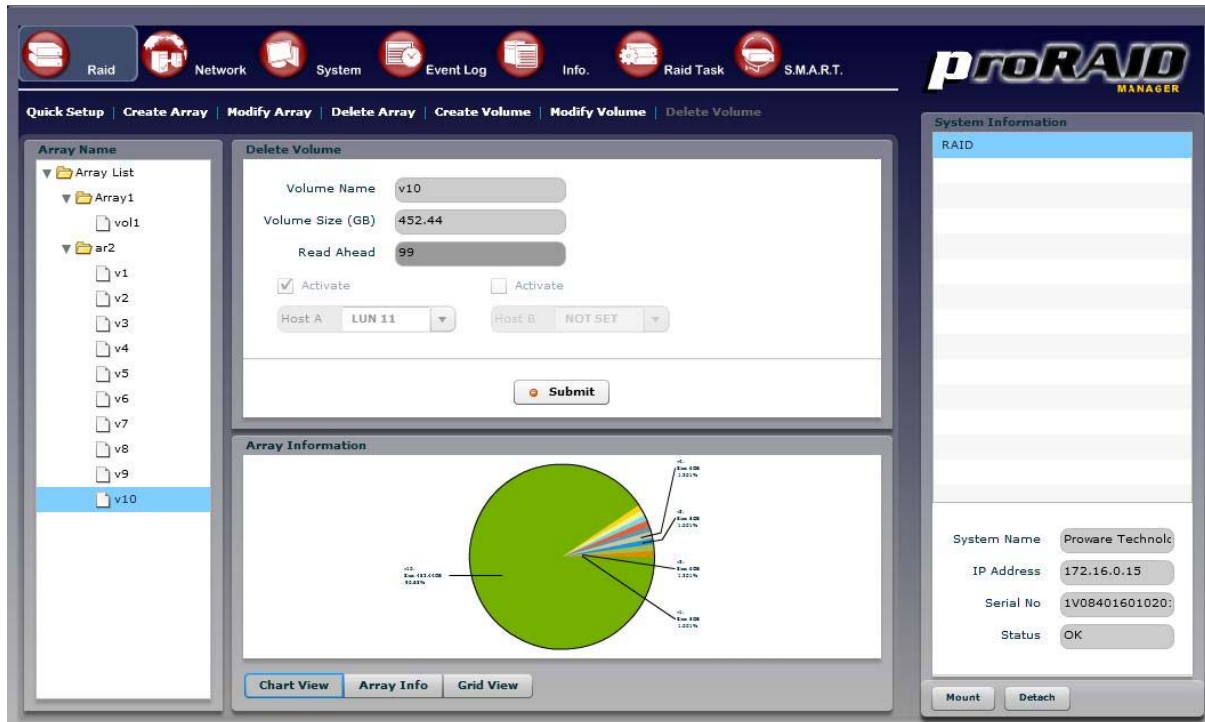
2. Click "Submit". A warning message will be displayed. Click "OK" to proceed.

3. The Volume will be deleted.
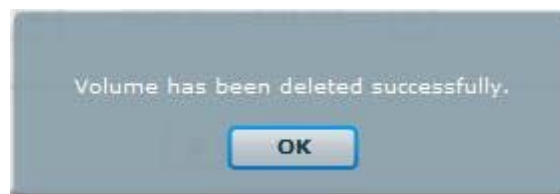
> **IMPORTANT: Make sure that the data in the Volume to be deleted is no longer needed before deleting the Volume.**

Chapter 7   Network Management

7.1   Network Settings

To setup the R-Link Ethernet port:

1. Select "Network Settings" from Network menu.

2. Set the following options:

Option	Description
IP Address	Enter the IP address you want to assign to the RAID subsystem.
Gateway	Enter the Gateway IP Address you want to use.
Subnet Mask	Enter the Subnet Mask value.
MAC Address	This shows the MAC Address of the network interface.

3. Click "Submit" to save the settings.

7.2 SNMP Setting

The SNMP gives users independence from the proprietary network management schemes of some manufacturers. SNMP is supported by many WAN and LAN manufacturers enabling true LAN/ WAN management integration.

To set the SNMP function:

1. Select "SNMP Setting" from Network menu.

2. Tick the "Enable SNMP Notification" option. Then setup the necessary options.

Option	Description
Description	Enter a description.
Contact	Enter the Contact information.
Name	Enter the Name information.
Location	Enter the Location information.
GetCommunity	Enter or change the GetCommunity value if needed.
SetCommunity	Enter of change the SetCommunity value if needed.
Trap ID 1	Enter the first Trap receiver IP address.
Trap ID 2	Enter the second Trap receiver IP address.
Trap ID 3	Enter the third Trap receiver IP address.

3. Click "Submit" to save the settings.

7.3 SMTP Setting

To set the Mail Notification function:

1. Select "SMTP Setting" from Network menu.

2. Tick the "Enable Mail Notification" option. Then setup the necessary options.

Option	Description
SMTP Server	Enter the SMTP Server IP address.
Use Secure Authentication	To use secure authentication in SMTP server, enable this option.
Account	Enter the account information.
Password	Enter the password for the account.
Sender	Enter the sender's email address.
Receiver	Enter the receiver's email address.

3. Click "Submit" to save the settings.

7.4 NTP Setting

NTP (N**etwork Time Protocol**) is an Internet standard protocol used to synchronize the clocks of computers to some time reference.

By default, "Use Local Time Setting" is selected. This means the RAID subsystem will get time information from local computer. Whenever the RAID subsystem is started or restarted, you need to use "Sync RTC". RTC Stands for Real Time Clock and is used to set the time on the RAID controller. Setting the correct time plays an important role in the system administration which helps administrators keep accurate record of when the events actually occur.

To set the NTP function:

1. Select "NTP Setting" from Network menu.

2. Select the "Sync with a NTP Server" option. Then setup the necessary options.

Option	Description
Time Zone	Select the local time zone.
NTP Server	Enter the NTP Server IP Address.
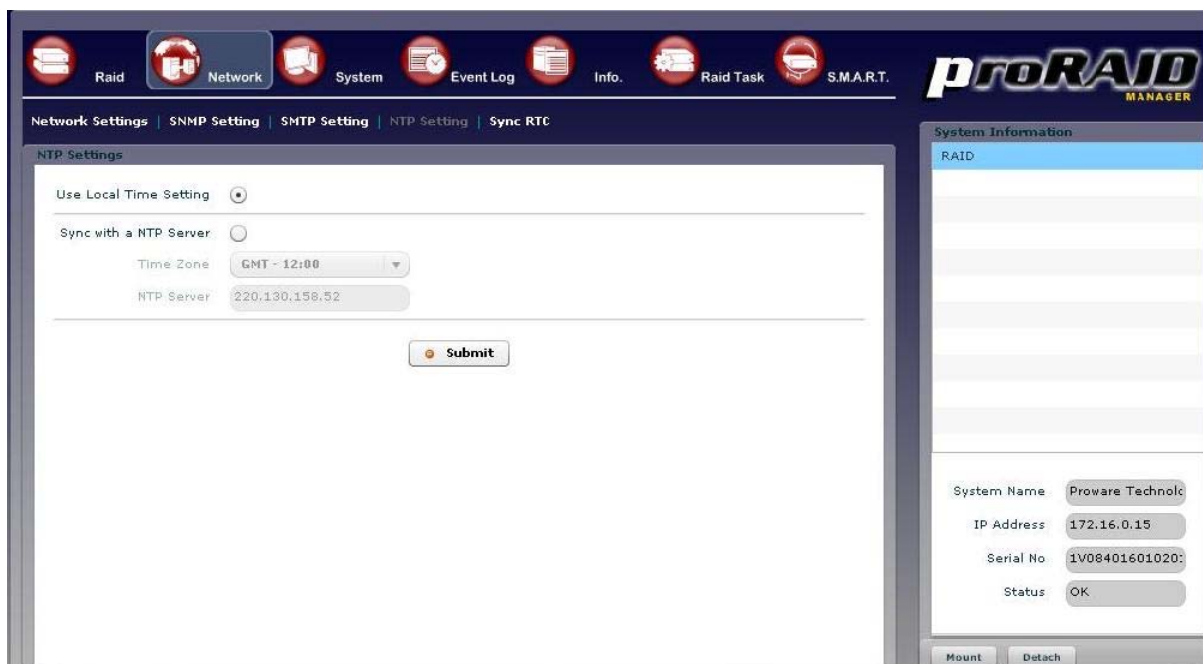
3. Click "Submit" to save the settings.

7.5   Sync RTC

When time setting is not configured to get time from an NTP server ("Use Local Time Setting" option is selected in NTP Setting), the "Sync RTC" function must be used whenever the RAID subsystem is started or restarted.

RTC Stands for Real Time Clock and is used to set the time on the RAID controller. Setting the correct time plays an important role in the system administration which helps administrators keep accurate record of when the event actually occurs.

To Sync RTC, select "Sync RTC" from Network menu and click "Submit".
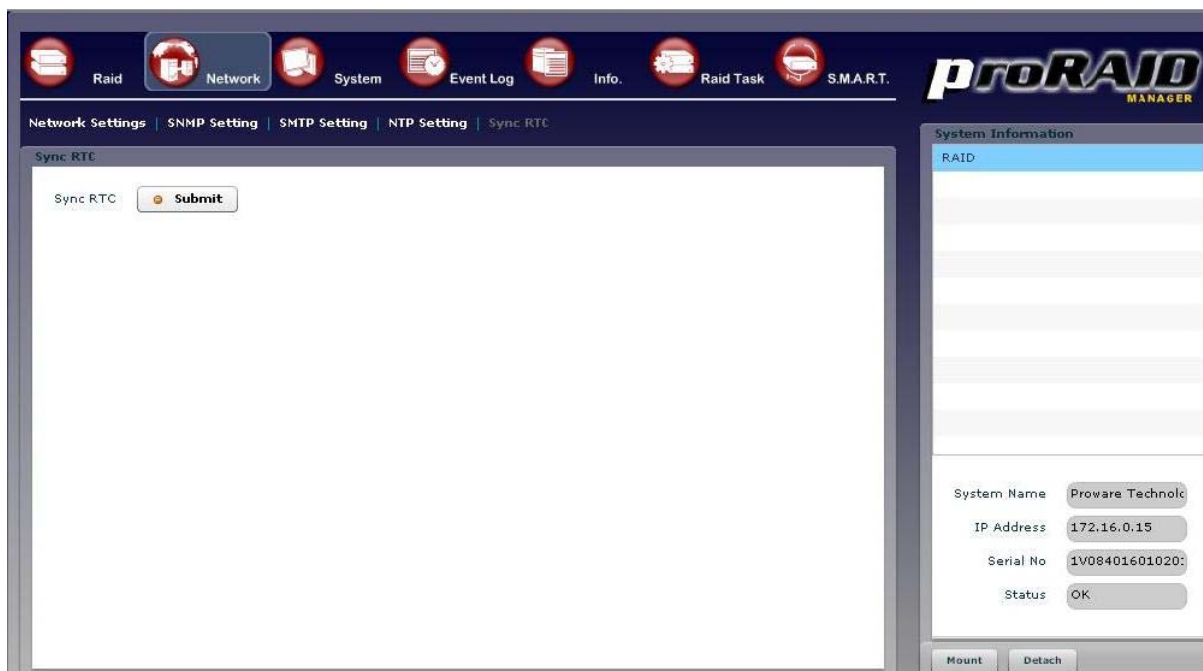
Chapter 8   System Management

8.1   System Setting

Some RAID subsystem System settings can be configured to the user's preference to match certain application.
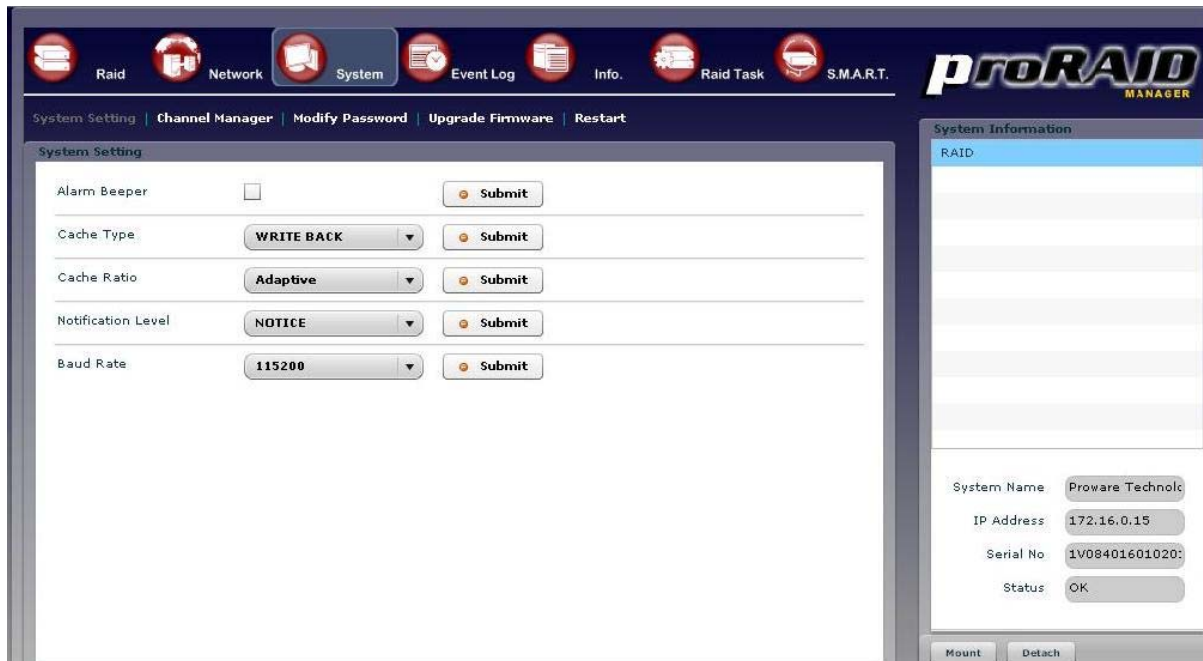
The following can be set using "System Setting" function in System menu:

Alarm Beeper:
The Alarm Beeper function item is used to Disable or Enable the RAID subsystem alarm tone generator. When Alarm Beeper option is checked, the alarm beeper is enabled.

Cache Type:
The RAID subsystem supports Write Through and Write Back cache type. Write Back allows temporary saving of data in the volatile cache memory and data are acknowledged to have been received once it reaches the cache memory. Write Through allows saving the data in the disk drives and data confirmation is acknowledged once the data are written to the disk drives.

Cache Ratio:
Select 10% to 90% or adaptive.

Notification Level:

Events are classified to 5 levels (Critical, Error, Warning, Notice, Info).

Event	Log Level
Slot inserted	Notice
Slot removed	Notice
Temperature back to normal	Notice
Voltage back to normal	Notice
PSU back to normal	Notice
Fan back to normal	Notice
UPS not present	Notice
UPS standby	Notice
Array deleted	Notice
Array created	Notice
Array modified	Notice
Array initialization completed	Notice
Array rebuild completed	Notice
Array expansion completed	Notice
Array parity checking completed	Notice
Disk clone succeeded	Notice
Volume created	Notice
Volume deleted	Notice
Volume modified	Notice
Over temperature	Warning
Over voltage	Warning
Low voltage	Warning
PSU not present	Warning
Fan not present	Warning
Fail to setup network configuration	Warning
Array initialization failed	Warning
Array rebuild failed	Warning
Array expansion failed	Warning
Array parity checking failed	Warning
Disk clone failed	Warning
Mirror disk clone failed	Warning
System restart	Warning
Parity error detected	Warning
Power Supply Unit(PSU) Fail	Error
Fan fail	Error
UPS on battery	Error
Bad sector reallocation	Info

Baud Rate:

Set the baud rate: 19200, 38400, 57600 or 115200 (Default: 115200)

To save the change in each setting, click the "Submit" button.

8.2 Channel Manager

The Channel Manager can be used to configure the SCSI Host Channels A and B options to the preferred settings. Select "Channel Manager" function in System menu.

For each Host Channel, the SCSI ID, Wide, Speed Setting, Current Speed, and Tag Queue can be set.
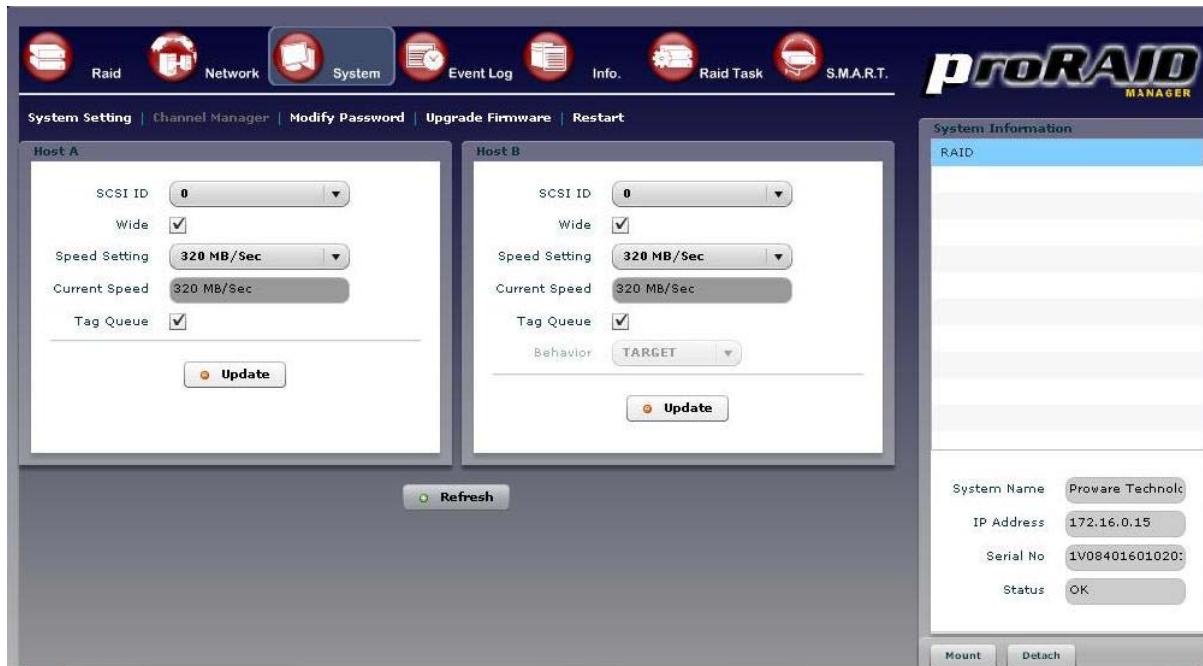
Option	Description
SCSI ID	Select 0 to 15 or Multiple ID. The RAID subsystem is like a large SCSI device. A SCSI ID should be assigned and selected from the list of SCSI IDs. If Multiple ID is selected, you can map ID to a host channel.
Wide	If enabled for a wide bus, the throughput is double transfer rate, because each transfer is of 16 bits or two bytes. For example, if Wide option is enabled, the Speed Setting can have maximum transfer speed of 320MB/sec.
Speed Setting	Select the preferred Speed setting. The options are 80 MB/sec, 160 MB/sec, and 320 MB/sec for Wide mode. 40 MB/sec is available when Wide is disabled.
Current Speed	This shows the current speed for the host channel.
Tag Queue	When this option is enabled, it enhances the overall system performance under multi-tasking operating systems by reordering tasks or requests in the command queue of the RAID system. This function should normally remain enabled.

After setting the preferred option, click "Update" to save the changes.

To see the current settings, click "Refresh".

8.3 Modify Password

To set or change the login password of RAID subsystem, click "Modify Password" function in System menu. Enter the old password in the Old Password field, and the new password in the New Password and Confirm New Password fields.

Click "Submit" to save the change.

8.4 Upgrade Firmware

The RAID controller's firmware can be upgraded when new firmware version is available.

Select "Upgrade Firmware" function in System menu then click "Upload".
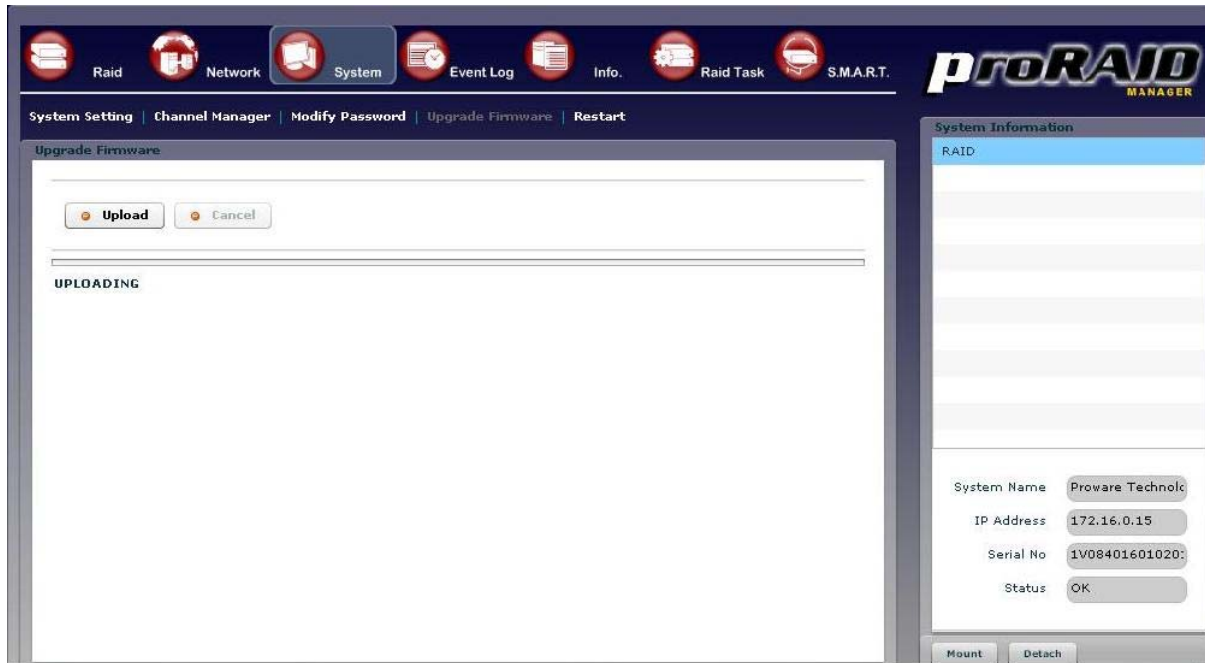
Select the firmware file. Click "Open" to start updating.
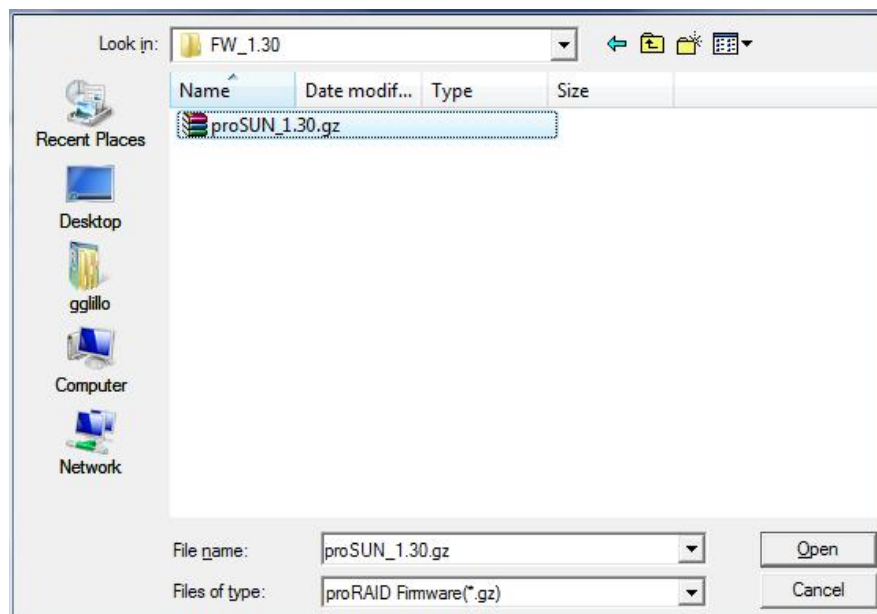
The firmware file will be uploaded to the RAID controller. Then the upgraded process will be started.
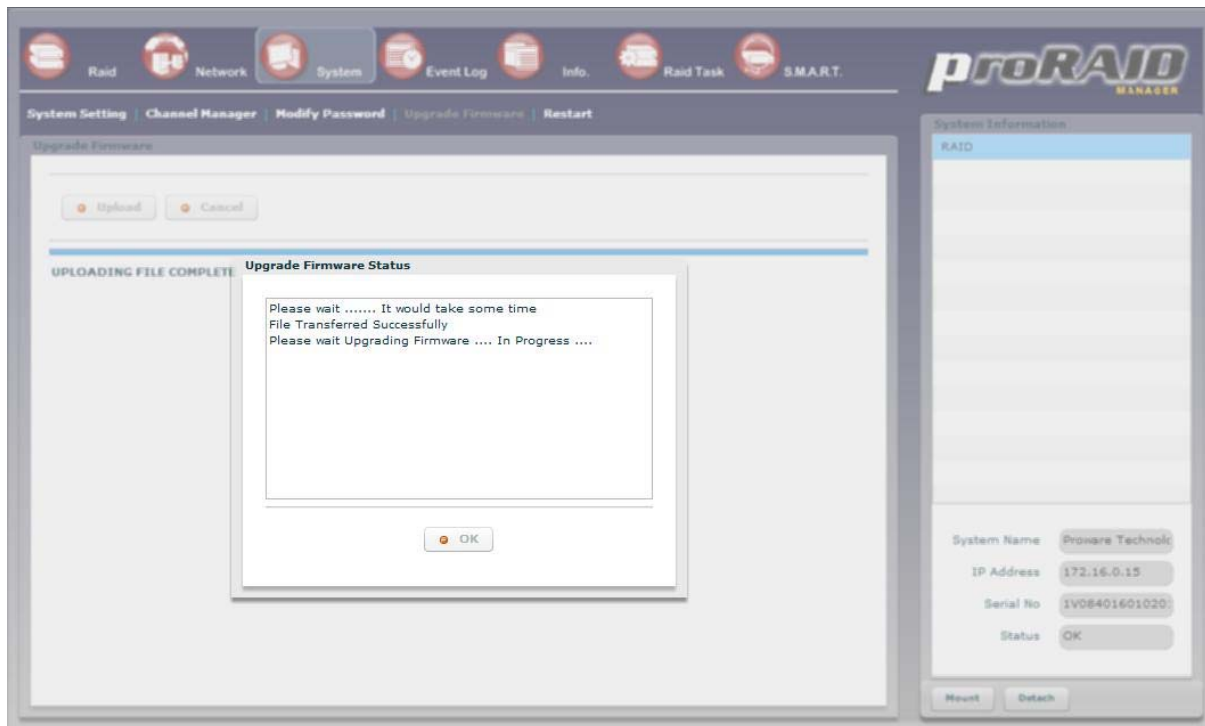
After the upgrade is completed, the subsystem will automatically restart. User needs to login again to proRAID Manager GUI after subsystem has restarted.

8.5 Restart

The RAID subsystem can be restarted using the "Restart" function in System menu.

Click the "Submit" button to restart the RAID subsystem.
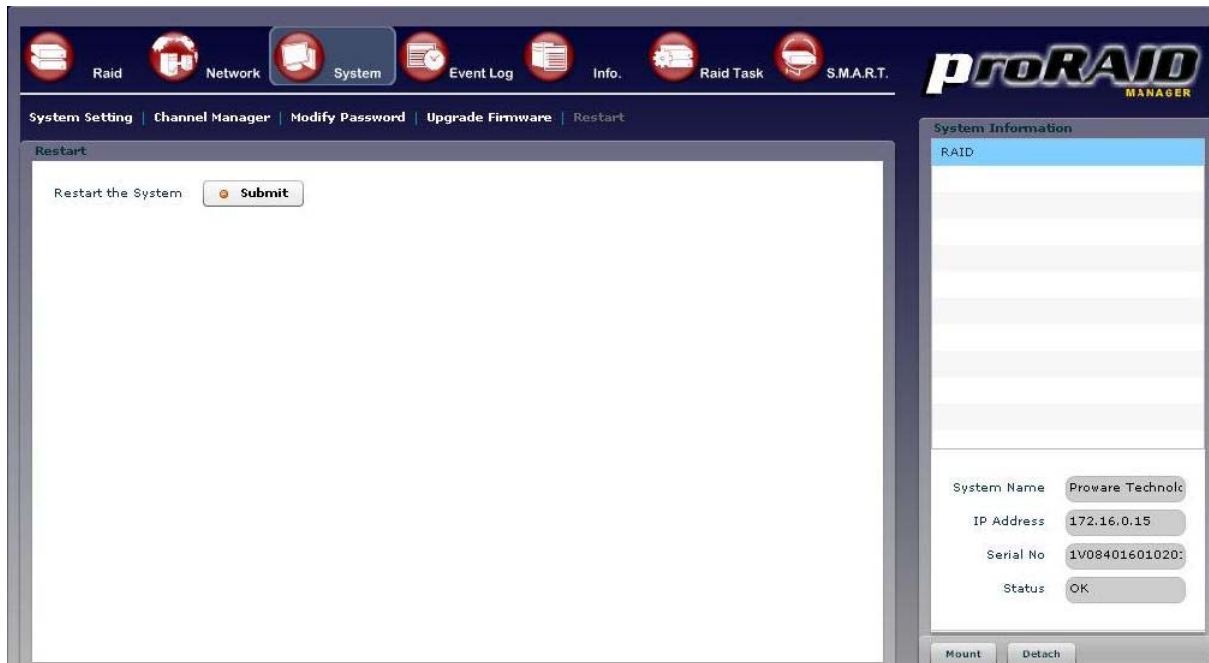
Chapter 9   Event Log

9.1   Event Log

The RAID subsystem's event log information can be displayed by selecting "Event Log" function in Event Log menu.
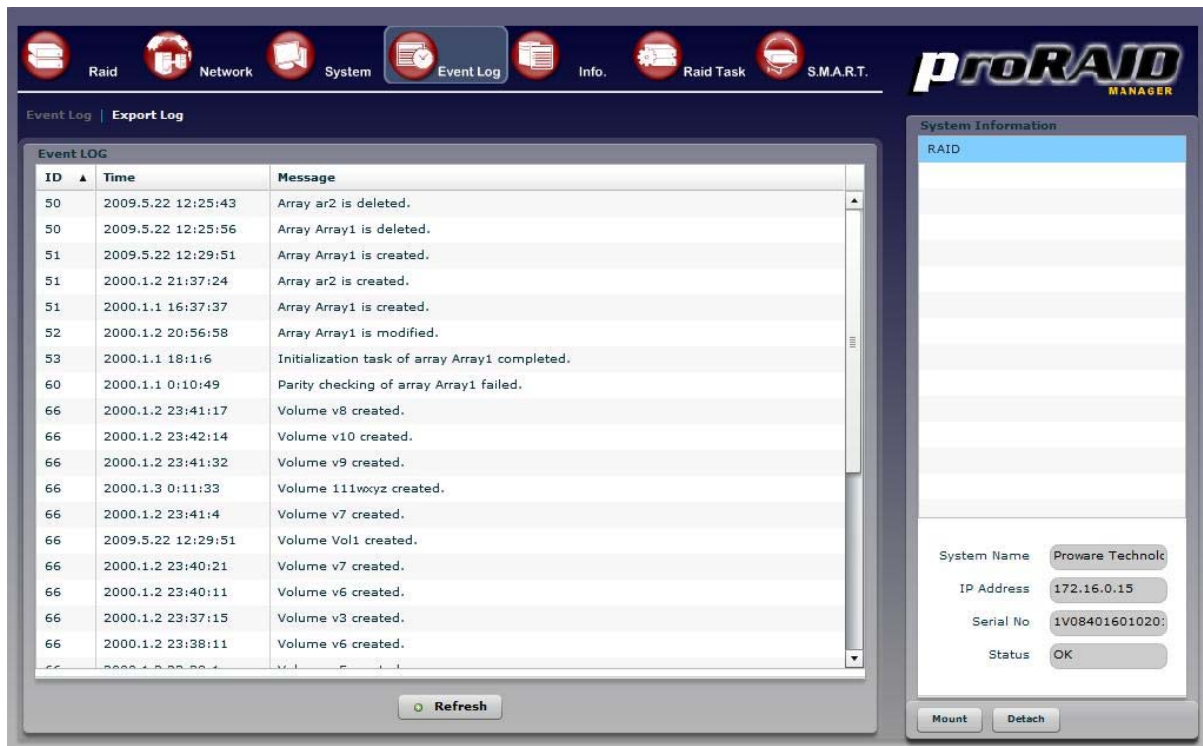
To update the current displayed event logs, click "Refresh".

9.2 Export Log

The RAID subsystem's event log information can be saved to local destination by selecting "Export Log" function in Event Log menu.

Click "Submit" to save the event log. The file type of the exported event log will be in XML.
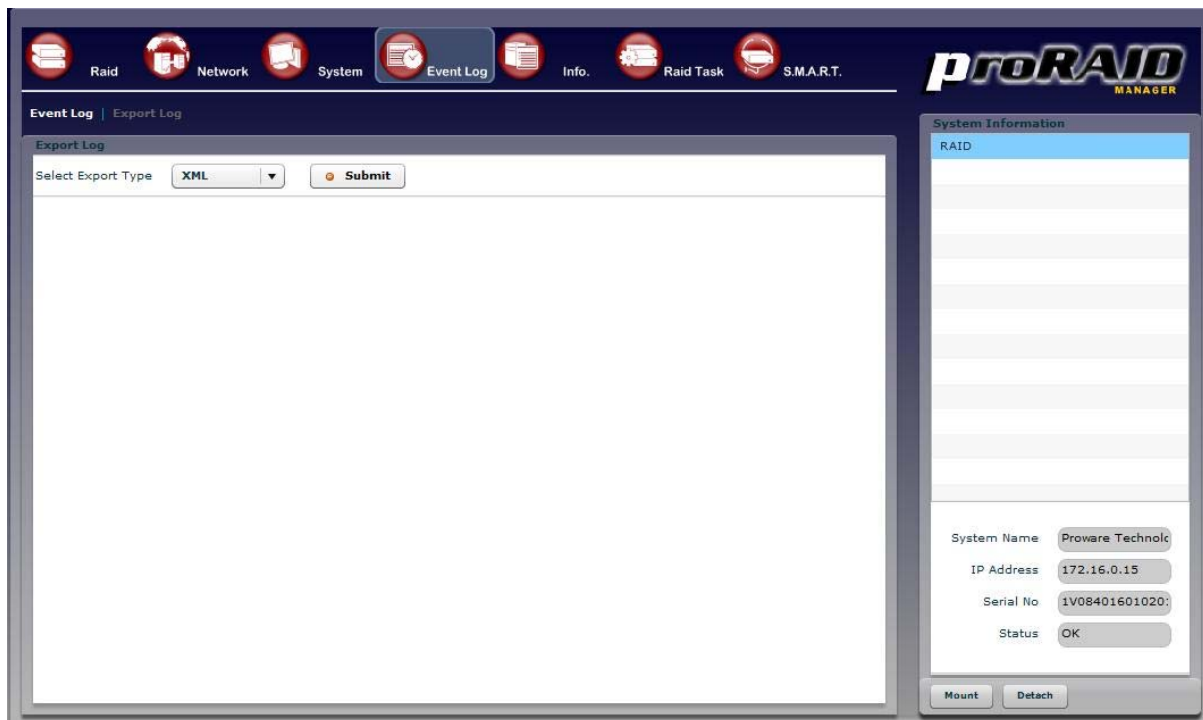
Chapter 10   Information

10.1   Disk Information

To view detailed information about the disk drives in the RAID subsystem, select "Disk Info" function in Info menu. The Slot ID (Disk#), the disk vendor, model, capacity, number of remapped bad sectors, firmware version, and state are shown.

When disks are already member of an Array, the State will show USED. It will show FREE when not yet used.

Each member disk drive can be mark as faulty. Click the "Mark Faulty" button for the disk drive.

> **NOTE: Setting disk as faulty can cause unrecoverable data damage for some RAID levels. Use this function with caution.**

10.2 RAID Information

To view information about existing Array and Volume in the RAID subsystem, select "RAID" function in Info menu. Then select the Array name from the list of Arrays. The Array Info and Logical Volume Details will be displayed.

The logical volume details can be shown in grid view using "Grid View" button. Default is Chart View.
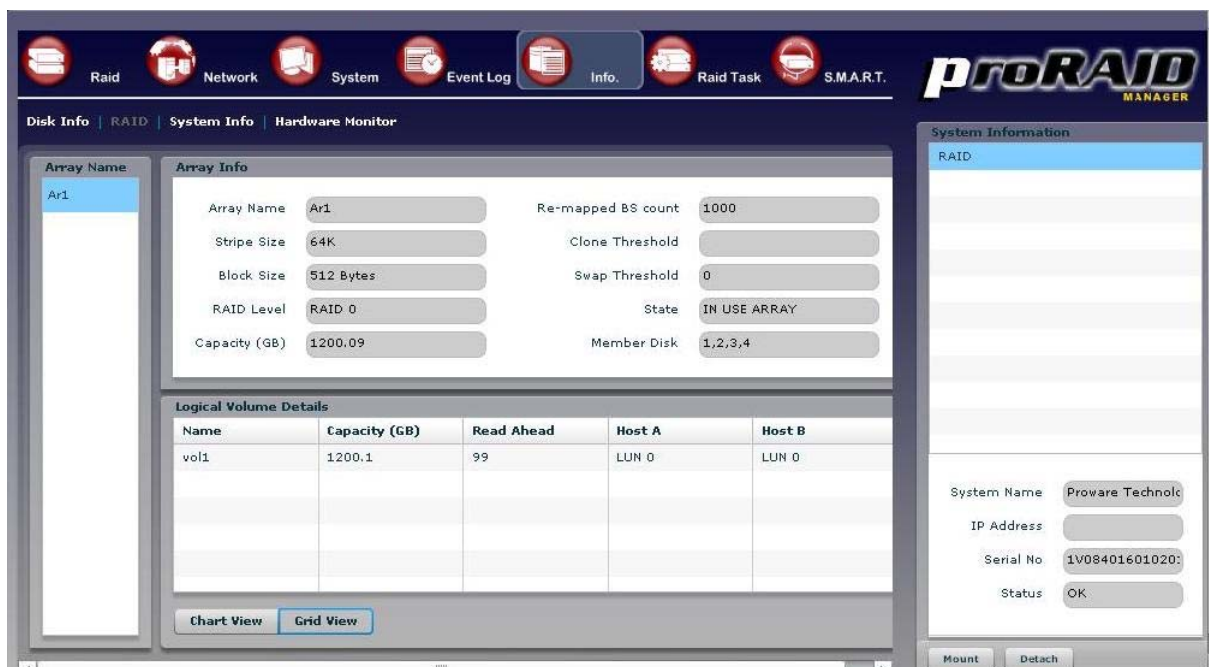
10.3 System Information

Use the "System Info" function in Info menu to view the RAID subsystem information. The Vendor Name, Serial No., Product ID, CPU Name, CPU Speed, Memory Size, Memory Speed, BBM Module installed or not, ECC DRAM support, Subsystem Model, Controller Model, Firmware Version, Disk Channel Type, Number of Host Channels, Host Channel Type, Host Channel Sync Speed, Number of Slots, Number of Backplane Slots, Baud Rate, Cache Type, Cache Ratio, Beeper enabled or not, Log Level, proSES enabled or not, and JBOD Model appear in this screen.

10.4 Hardware Monitor

To view RAID subsystem's hardware information, select "Hardware Monitor" in Info menu.
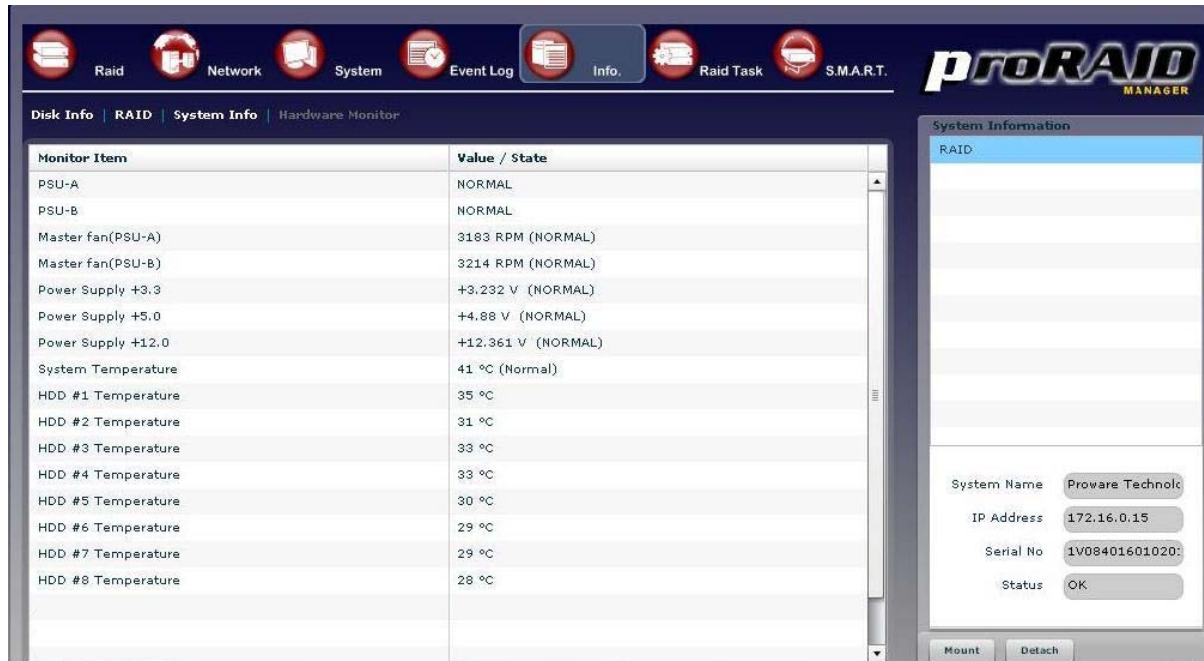

The Hardware Monitor information provides the power supply status, fan speed, temperature, and voltage levels of the RAID subsystem. All items are also unchangeable. The warning messages will indicate through the LCD, LED and alarm buzzer.

Item	Warning Condition
Fan Speed	< 2000 RPM
Power Supply +3.3V	< 2.97V or > 3.63V
Power Supply +5.0V	< 4.5V or > 5.5V
Power Supply +12V	< 10.8V or > 13.2V
System Temperature	> 70℃
HDD Temperature	> 55℃

Chapter 11   Raid Task

11.1   Raid Status

To view the RAID status of an Array, select "Raid Status" in Raid Task menu. The List of Arrays, and the RAID Level, Capacity, Member Disks and Status are displayed.

	The states available are:
Status	- Ready - Need to Rebuild - Initializing - Rebuilding - Expanding - Verifying - Cloning - Fail If the RAID is rebuilding, initializing, expanding, checking or cloning, the progress of the task will be displayed, e.g. 'Initializing 75%'.

A Parity Check function is available for existing Arrays with parity, such as those configured with RAID level 3, 5, 6, 30, or 50, to check the consistency of parity blocks, i.e. verify that parity information matches the stored data.

Click "Check Parity" button to start performing parity check. A message will be displayed. The percentage of parity checking progress is displayed in Status field.
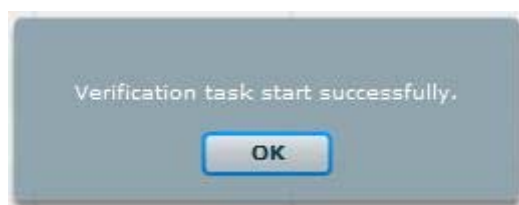
To cancel current Parity Check process, click the "Cancel Parity" button.
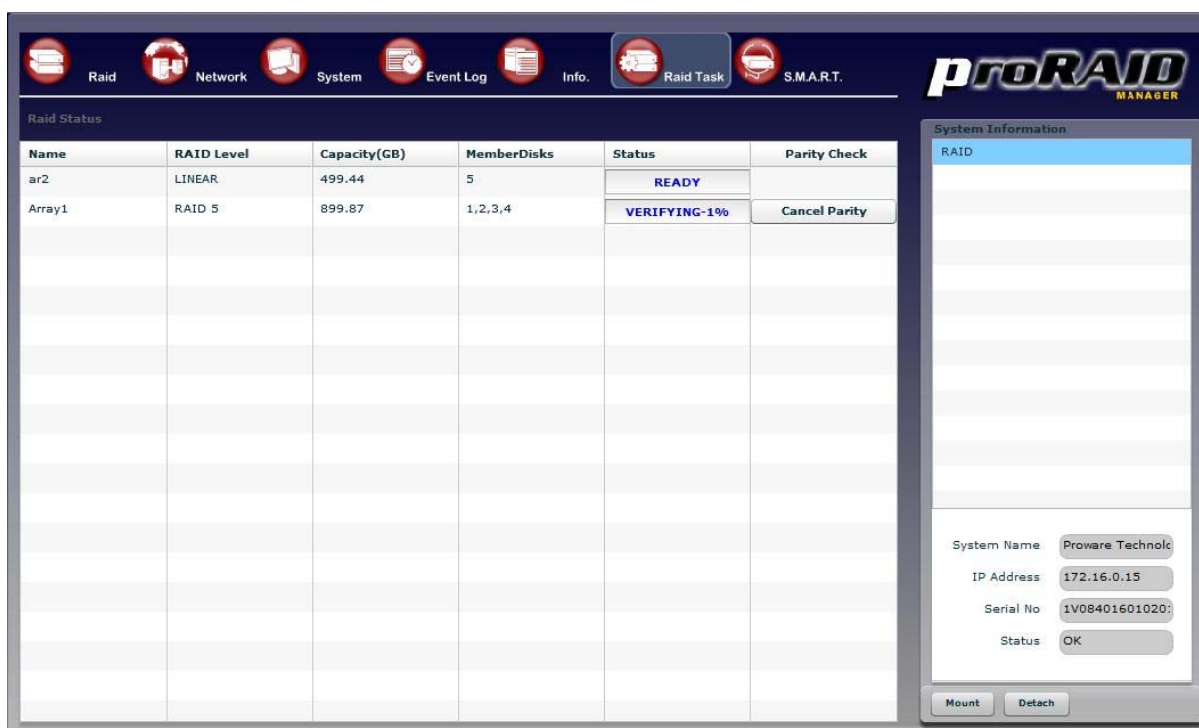
A message will be displayed.

Chapter 12   S.M.A.R.T.

12.1   Disk Health

The RAID subsystem uses the SMART (Self-Monitoring, Analysis and Reporting Technology) information available in the disk drive to monitor the disk health.

To view SMART information of a disk drive, select "Disk Health" in S.M.A.R.T. menu. Then click the disk drive. The Disk ID and Disk Status of the selected disk are displayed. The SMART attributes and its values and threshold values are also shown.

The Threshold Value is the boundary for the attribute Value before the disk becomes unstable. The higher the attribute Value compared to the Threshold Value, the better. If the attribute Value becomes smaller than the Threshold Value, the disk is not in good state.
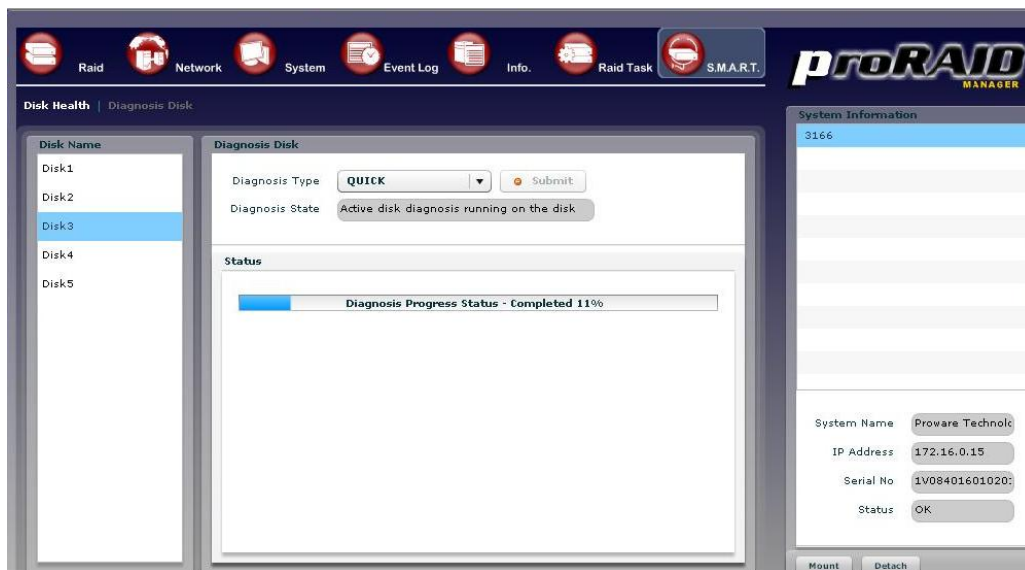
12.2 Diagnosis Disk

A diagnostic function is available to diagnose the disk health status.

Select "Diagnosis Disk" in S.M.A.R.T. menu. There are two types of diagnosis: Quick and Extended.
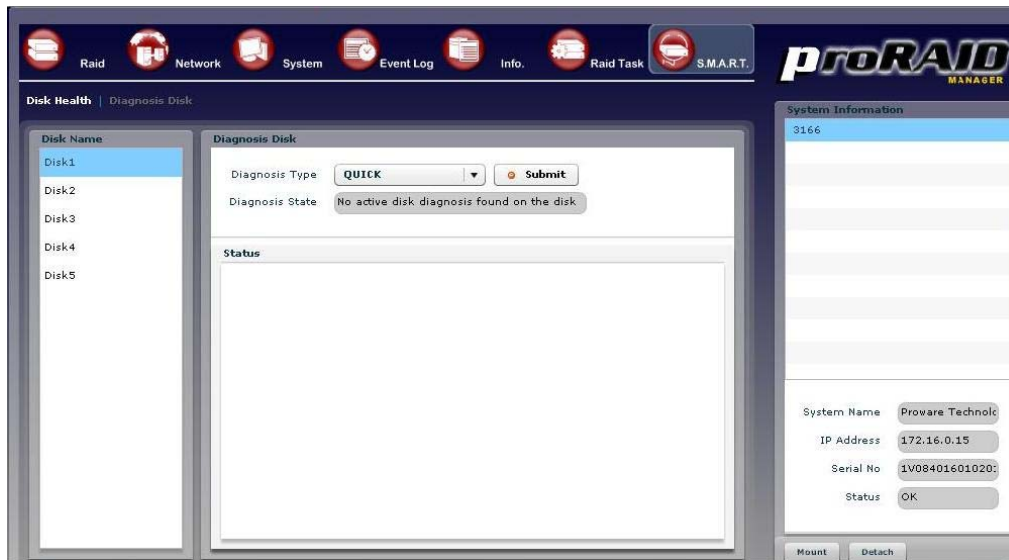
After selecting the Diagnosis Type, click "Submit". The disk diagnosis process will start.

NOTE: When Disk Diagnosis is running, it cannot be stopped. It must be completed.

The "Extended" Diagnosis Type takes long time to complete, from few hours to several hours depending on the size of the hard disk.